DESCRIPTION OF A NEW SPECIES OF COOT FROM THE WEST INDIES.

By ROBERT RIDGWAY.

Fulica caribæa, sp. nov.—Sp. CHAR. Similar to *F. americana*, but differing in the slenderer bill and in the form and color of the frontal shield. Frontal shield oval or elliptical, much wrinkled, .70 — .90 of an inch long, and .35 — .50 wide, in the breeding season; its color pale brownish (whitish in life ?) instead of chestnut or liver-brown, as in *F. americana*.

Hab.—Islands of Guadeloupe and Saint John's, Lesser Antilles.

A male and female from Saint John's (F. A. Ober, coll.) and an adult from Guadeloupe (L. Guesde, coll.) agree in the above characters which, on comparison with an extensive series of *F. americana*, appear sufficient to justify their separation as a resident local species or race. The plumage is quite identical with that of *F. americana*, and the bill is marked with the same well-defined subterminal brown spots; but there is no trace whatever of the dark color on the frontal shield, always present and conspicuous in *F. americana*.

The Museum possesses a specimen of *F. americana*, in breeding dress, from Grenada.

A REVIEW OF THE AMERICAN SPECIES OF EPINEPHELUS AND RELATED GENERA.

By DAVID S. JORDAN and JOSEPH SWAIN.

In the present paper we give the synonymy of the species of *Epinephelus* and allied genera known from American waters, an analytical key by which the species recognized by us may be distinguished, and full descriptions of most of the species which we have been able to examine. These specimens belong in part to the United States National Museum and in part to the Museum of the University of Indiana.

The group here discussed corresponds very nearly to the genus *Epinephelus* in the sense in which it is understood in the later papers of Bleeker. The *Epinephelini* include, as understood by us, those *Serranina* which have the maxillary provided with a supplemental bone, the teeth of the inner series in both jaws depressible, the front of each jaw with two fixed canines which are sometimes obsolete, the dorsal fin continuous, the soft dorsal with 15 to 19 rays, and the bones of the cranium without prominent spinous ridges. This definition excludes the nearly related genera *Stereolepis* and *Polyprion* as well as the more remote *Serranus*, *Anthias*, *Paranthias*, &c. As further distinguishing the *Epinepheli* from *Serranus* and *Anthias* we have the small scales and the number of the dorsal spines, which in *Serranus* is always ten, and

in the *Epinepheli* is generally eleven (in one genus nine and in a single species ten). There can, we are sure, be no possible question of the propriety of separating *Epinephelus* at least as a whole from *Serranus* (typified by *Serranus scriba*). The relations of *Epinephelus* and *Serranus* are indeed not very close, and only in an artificial grouping could they be confounded.

Whether it is desirable to subdivide *Epinephelus* into genera depends somewhat on the value which we wish to give to a genus. As a whole, the species certainly form a natural group. It is also true that they divide readily into several smaller groups, several of which are well defined, easily recognized, and apparently natural. In the present paper six of these are regarded as distinct genera, though we should not seriously object to regarding them as subgenera of a single genus *Epinephelus*, as in some other publications we have already done. Four of these groups (*Mycteroperca*, *Alphestes*, *Promicrops*, *Dermatolepis*) are characteristically American. The others (*Epinephelus*, *Enneacentrus*) are cosmopolitan. *Epinephelus* is the central genus of the group. *Epinephelus* and *Enneacentrus* are also much less homogeneous than the other genera, and perhaps may admit of further subdivision.

We cannot, however, regard the several groups (*Schistorus*, *Hyporthodus*, *Labroperca*, *Petrometopon*, *Menephorus*, &c.) as being worthy of consideration as genera on the basis of the definitions which they have thus far received. While some of these may be possessed of "cranial characters" sufficiently distinctive, it remains to be shown what these cranial characters are, and that they are not, like other characters, subject to intergradation, so their existence becomes merely a question of more or less.

As the purpose of this paper is, however, to facilitate the identification of species, we proceed at once to an analysis of the chief external characters which distinguish the six genera admitted by us.

ANALYSIS OF GENERA ALLIED TO EPINEPHELUS.

a. Scales or some of them more or less ctenoid; canines distinct in front of each jaw; body oblong, elongate; preopercle more or less serrate.

b. Dorsal spines eleven (ten in *Epinephelus analogus*).

c. Anal fin elongate, its rays III, 11 or III, 12; caudal fin lunate or truncate; spines slender, those of the anal fin graduated; lower jaw strongly projecting; cranium rather broad between the eyes, posteriorly with three subequal crests; scales small, largely cycloid, those of the lateral line simple; pyloric cœca few (12 to 20); soft dorsal with 16 to 18 rays.

MYCTEROPERCA, 1.

cc. Anal fin short, its rays III, 8 or III, 9; spines rather robust; posterior part of cranium with the lateral crests little developed; scales ctenoid.

d. Scales of lateral line each with 4 to 6 strong radiating ridges; cranium extremely broad and depressed between the eyes; the anterior profile a little concave; lower jaw projecting; pyloric cœca excessively numerous; second dorsal with 16 rays; caudal much rounded; size very large.

PROMICROPS, 2.

dd. Scales of lateral line simple; cranium narrow between the eyes; pyloric cœca few or many; soft dorsal with 15 to 17 rays.

e. Preopercle without a strong antrorse spine at its angle...EPINEPHELUS, 3.

ee. Preopercle with a single (rarely 2) strong spine directed downward and forward, near its angle .....ALPHESTES, 4.

bb. Dorsal spines nine; scales ctenoid, those of the lateral line simple; spines rather strong; cranium rather narrow between orbits, its lateral crests posteriorly little developed; soft dorsal with 14 or 15 rays; size small ; pyloric cœca few.

ENNEACENTRUS, 5.

aa. Scales all smooth; canines very small or obsolete; head rather small, the body comparatively deep; soft dorsal unusually long of 19 or 20 rays; spines low.

DERMATOLEPIS, 6.

I.—Genus MYCTEROPERCA.

MYCTEROPERCA, Gill, Proc. Ac. Nat. Sci. Phila., 1863, 80 (*olfax:* diagnosis erroneous).
TRISOTROPIS, Gill, Proc. Ac. Nat. Sci. Phila., 1865, 104 (*guttatus=cardinalis*).
PAREPINEPHELUS, Bleeker, Systema Percarum Revisum, 1875, 257 (*acutirostris=scirenga:* diagnosis erroneous).

The species of this genus closely resemble those of *Epinephelus*, but are distinguished by a number of minor characters, apparently constant, as well as by the differences in the structure of the cranium, described in detail by Professor Gill in the paper on *Trisotropis*, above cited.

ANALYSIS OF SPECIES OF MYCTEROPERCA.

a. Second dorsal spine shorter than third, the third and fourth longest.

b. Margin of anal fin posteriorly concave, its middle rays much exserted.

c. Center rays of caudal scarcely produced, not two-thirds length of head; canine teeth moderate; angle of preopercle little salient; scales small (lat. l. about 130); color plain red; vertical fins without black edgings .....ROSACEA, 1.

cc. Outer rays of caudal much produced, more than two-thirds length of head; preopercle with salient angle; canine teeth strong; scales small (lat. l. 140); color brownish with small darker spots; vertical fins broadly edged with blackish .....FALCATA, 2.

bb. Margin of anal not concave; caudal simply lunate or subtruncate.

d. Body with light and dark cross-bars; anal fin with angular margin, subtruncate posteriorly; preopercle without salient angle; scales small (lat. l. 133); form rather robust.....TIGRIS, 3.

dd. Body without cross-bars; soft parts of vertical fins broadly edged with blue-black, and with a narrow pale margin.

e. General color dusky olivaceous, more or less marbled with darker; no distinct red anywhere and no distinct black spots; pectoral not broadly edged with orange.

f. Interorbital area channeled; angle of preopercle little salient; body slender; caudal little concave; scales smallish (about 120); sides with small faint spots of darker; commissure with yellow-green .....INTERSTITIALIS, 4.

ff. Interorbital space not distinctly channeled.

g. Angle of preopercle salient, armed with stronger teeth.

h. (Nostrils very close together, separated only by a vertical membrane; scales small (about 130); caudal subtruncate, its angles produced; commissure with yellowish; body covered with small round yellowish spots.) .....CALLIURA, 5.

hh. Nostrils well separated; no yellowish spots.

i. (Caudal peduncle with a black spot on each side; body dark brown, the lower half abruptly paler; young specimens; the scales undescribed.).....DIMIDIATA, 6.

ii. Caudal peduncle without black spot.

j. Scales very small (about 140); cheeks without distinct dusky stripes; commissure without yellow; caudal distinctly lunate; gill-rakers few, about 12 on lower part of anterior arch.
MICROLEPIS, 7.

jj. Scales moderate (about 100); cheeks with radiating dusky stripes; caudal subtruncate, the angles slightly produced; gill-rakers in increased number about 30 on lower part of arch.SCIRENGA, 8.

gg. Angle of preopercle not salient, its teeth scarcely enlarged; gill-rakers rather few.

k. Gill-rakers rather slender, about 10 developed on lower part of anterior arch, besides several rudiments; caudal subtruncate; posterior nostril small; scales not very small (about 110); sides of head and body with rivulations of dark bluish around roundish dark bronze spots, large or small (these markings subject to considerable variation, fading in spirits); sides with darker quadrate areas.....BONACI, 9.

kk. Gill-rakers very few, short and thick, about 6 developed on lower part of anterior arch, besides about three rudiments; caudal lunate; posterior nostril large; canines strong; scales rather small (about 125); head with very distinct reticulations of darker olive surrounding rather large (yellowish?) spots; body more faintly reticulate.....RETICULATA, 10.

ee. General color pale, bright red, or grayish, with roundish spots or blotches of black or red darker than the ground color; the blacker blotches along middle of sides much larger and quadrate in the young; red always present somewhere in life (fading in spirits); pectorals blackish, in the adult, broadly tipped with orange yellow; preopercle without salient angle; scales rather small (about 125); caudal lunate; gill-rakers very few and short (about 8 below angle).....VENENOSA, 13.

aa. Second dorsal spine highest, its length nearly one-third that of head; caudal slightly lunate; canine teeth feeble; angle of preopercle a little salient; anal fin low; (maxillary scaleless?); color brown, mottled.....OLFAX, 14.

1. Mycteroperca rosacea.

Epinephelus rosaceus, Streets, Bull. U. S. Nat. Mus., vii, 1877, 51. (Angel Island; Gulf of California.)

Trisotropis rosaceus, Jordan & Gilbert, Bull. U. S. Fish Comm., 1882, 107. (Mazatlan.)

Habitat.—Gulf of California.

Head, $2\frac{4}{5}$ ($3\frac{1}{4}$); depth, $2\frac{7}{8}$ ($3\frac{2}{5}$). D. XI, 18; A. III, 11. Scales, 25–*ca* 130–x. Length (28131, Mazatlan), 38 inches.

Body rather elongate, compressed; head large, compressed, pointed anteriorly, the anterior profile nearly straight or slightly convex; snout rather long and sharp, $3\frac{1}{8}$ in head. Mouth large, the maxillary reaching to opposite posterior margin of eye, its length 2 in head. Teeth in moderate bands; canines of moderate size, nearly vertical, the lower

turned somewhat backwards. Eye 7 in head (adult). Interorbital space strongly convex, its breadth about 4 in head. Preopercle with the angle a little salient, the emargination above it rather distinct, the teeth small, those near the angle being somewhat enlarged. Nostrils rounded, very close together, the posterior much the larger. Gill-rakers rather few and long, about 17 on lower part of anterior arch. Scales small, chiefly cycloid.

Dorsal spines rather slender and low, the third $3\frac{2}{5}$ in head. Soft dorsal moderate. Caudal fin distinctly lunate, the upper lobe the longer, $1\frac{3}{4}$ in head. Anal very high and falcate, the middle rays produced in a point, their length $1\frac{2}{10}$ in head, the posterior rays rapidly shortened, so that the outline of the fin is much concave. Anal spines small, graduated. Pectorals reaching beyond tips of ventrals, 2 in head.

Color in life: body and fins nearly uniform brick red. Tip of pectorals dusky; vertical fins without distinct dusky edgings. In spirits, fading first to lemon color, then to dull gray. But two specimens, both adult, of this beautifully-colored species are known. The first was secured by Dr. Streets at Angel Island; the second, from which the above description was taken, was obtained by Dr. J. W. Bastow at Mazatlan, and by him presented to the National Museum.

The fish is very rare at Mazatlan. It was unknown to the fishermen.

2. Mycteroperca falcata. *Abadejo; Bacalao; Scamp.*

a. Var. *falcata.*

Serranus falcatus, Poey, Memorias de Cuba, ii, 138, 1860 (Havana).

Trisotropis falcatus, Poey, Synopsis Pisc. Cubens., 285, 1868 (Havana); Poey, Ann. Lyc. Nat. Hist. N. Y., 309, 1869 (Havana); Poey, Enum. Pisc. Cubens., 15, 1875 (Havana).

Serranus undulosus, Steindachner, Ichthy. Beiträge, xii, 3, 1882 (Rio Janeiro and Messina; *in part;* specimens with angulated anal, supposed to be males).

b. Var. *phenax* (var. nov.).

Trisotropis falcatus, Goode & Bean, Proc. U. S. Nat. Mus., 140, 1879 (Pensacola, Fla.); Poey, Bull. U. S. Fish Comm., ii, 118, 1882 (Key West, Fla.); Jordan & Gilbert, Proc. U. S. Nat. Mus., 273, 1882 (Pensacola, Fla.); Jordan & Gilbert, Synopsis Fishes North America, 538, 1883 (copied from Goode & Bean).

Epinephelus falcatus, Jordan, Proc. U. S. Nat. Mus., 1884, 124 (Key West).

Habitat—Var. *falcata*, Cuba to ? Brazil, ? Messina; var. *phenax*, coast of Florida, Pensacola, Key West.

Var. *falcata.*

DESCRIPTION OF SPECIMENS FROM HAVANA.

Head, $2\frac{7}{8}$ ($3\frac{2}{3}$); depth, $3\frac{1}{3}$ ($4\frac{1}{6}$). D. XI, 17; A. III, 11. Scales, 25–140 + x. Length, $14\frac{1}{2}$ inches.

Body moderately elongate, compressed, its greatest width $2\frac{2}{5}$ in its depth, head compressed, rather pointed anteriorly, the anterior profile

nearly straight. Mouth rather large, the maxillary reaching posterior border of eye, $2\frac{1}{5}$ in head; teeth in rather narrow bands; each jaw with two strong canines, rather larger than in any related species, those of the upper jaw directed very strongly forwards and slightly downwards; those of the lower jaw a little smaller, and directed similarly upwards and backwards. Eye larger than in var. *phenax*, 5 in head (adult). Interorbital space slightly convex, 5 in head. Nostrils close together, the posterior the larger. Upper limb of preopercle slightly convex, very finely serrate; a rather sharp notch above the angle, which is salient, and bears a few coarse teeth. Gill-rakers rather few, 19 or 20 on lower part of anterior arch. Scales small, mostly cycloid. Dorsal spines rather slender and weak, the outline of the fin gently curved, the second spine about equal to the eighth and higher than the tenth; the third and fourth spines longest, $2\frac{4}{5}$ in head: caudal and anal fins formed as in var. *phenax;* longest ray of anal, $2\frac{1}{4}$ in head; upper lobe of caudal, $1\frac{1}{3}$. Pectoral reaching tips of ventrals, $1\frac{4}{5}$ in head. Pyloric cœca 15 (Poey).

Color in life brown above; sides grayish brown, faintly covered with darker spots which disappear in spirits. Eyes and angle of mouth yellowish. Vertical fins dusky, the outer portions bluish black; ventrals and pectorals bluish black, the pectorals with a whitish edge.

Var. *phenax* (var. nov.).

Specimens from the Florida coast differ somewhat from all those observed at Havana, and we have thought best to designate them by a distinct name. The chief difference is in the direction of the canine teeth, which are rather weaker than in var. *falcata*, those of the upper jaw scarcely directed forward, those of the lower scarcely backward. The serræ on the preopercle are rather weaker than in var. *falcata*, and there is some difference in color, as is shown in the following notes on a specimen from Key West.

Head 3 ($3\frac{7}{8}$); depth, $3\frac{2}{5}$ ($4\frac{2}{5}$). D, XI, 18; A. III, 11. Scales, 24–135+ x. Length, 13 inches.

Color in life pinkish gray above, paler purplish gray below; upper parts and opercle thickly covered with small, rounded, irregular spots of dark brown. Sides with larger and fainter brown blotches, more or less horizontally oblong, and somewhat recticulate. Spinous dorsal brownish; soft dorsal darker, faintly spotted, edged with dusky and with a narrow rim of whitish anteriorly. Caudal, brownish, spotted with darker, its outer rays blackish posteriorly; anal dusky, blackish anteriorly, and edged with whitish. Pectorals plain, dusky toward the tips, edged with whitish. Ventrals pale, tipped with dusky; mouth pale, scarcely greenish.

This species reaches a smaller size than most others of this subgenus, the largest seen not weighing more than six or eight pounds. It is one of those most valued as food. The variety *falcata* is rather common

in the markets of Havana, where it is known as *Abadejo* or *Bacalao*, both words meaning cod. The variety *phenax* is abundant about the Florida Keys, being brought in every day to the markets of Key West. It is also often taken with the hook and line on the Snapper Banks at Pensacola. It is known everywhere on the Florida coast as "Scamp."

Little is known of the southward range of this species.

3. Mycteroperca tigris. *Bonací Gato.*

a. Var. *tigris* (brown variety).

Serranus tigris, Cuv. & Val., ix, 440, 1833 (San Domingo); Günther, i, 112, 1859 (copied).
Trisotropis tigris, Poey, Ann. Lyc. Nat. Hist. N. Y., 1869, 307 (Havana); Poey, Enum. Pisc. Cubens., 1875, 14.
Serranus felinus, Poey, Memorias Cuba, ii, 134, 1860 (Havana).
Serranus repandus, Poey, Mem. Cuba, ii, 135, 1860 (Havana).

b. Var. *camelopardalis* (red variety).

Serranus camelopardalis, Poey, Mem. Cuba, ii, 132, 1860 (Havana).
Trisotropis camelopardalis, Poey, Syn. Pisc. Cub., 283, 1868; Poey, Ann. Lyc. Nat. Hist. N. Y., 307, 1869; Poey, Enum. Pisc. Cub., 1875, 14.
Serranus rivulatus, Poey, Memorias Cuba, ii, 1860, 135 (Havana).

Habitat.—Cuba; San Domingo.

DESCRIPTION OF VAR. TIGRIS.

Head, $2\frac{3}{4}$ ($3\frac{1}{2}$); depth, $3\frac{1}{2}$ ($4\frac{1}{3}$). D. XI, 16; A. III, 11. Scales, 22–133–x. Length, 12 inches.

Body rather robust, somewhat compressed; its greatest width half its greatest depth; head moderately pointed, its anterior profile gently curved; mouth moderate, the maxillary extending slightly beyond eye, $2\frac{1}{3}$ in head; teeth in very narrow bands, the lateral teeth larger than in related species; each jaw with two strong canines in front, not directed forward; eye small, 7 in head; interorbital space convex, 6 in head; posterior nostril much larger than anterior, not twice its own diameter from eye; preopercle with a very slight notch, the angle not at all salient, but with slightly enlarged teeth.

Scales small, mostly ctenoid; dorsal spines rather slender, the second slightly longer than tenth, the third and fourth highest, $3\frac{1}{3}$ in head; caudal concave, the inner rays $1\frac{1}{6}$ in outer, which are $1\frac{2}{3}$ in head; anal with its posterior margin subtruncate, the longest rays $2\frac{1}{2}$ in head; pectorals reaching beyond tips of ventral, 2 in head. Pyloric cœca 15 (Poey). Color in life, olive brown, with about five pale grayish cross-bands, narrower than the interspaces, these bands almost obsolete in spirits. All the fins bluish black, the vertical fins edged with whitish, and the pectorals tipped with orange. Top of head reddish, becoming dusky in spirits.

According to Poey, his *Trisotropis camelopardalis* differs from *tigris* only in its redness of color. The case is apparently parallel with that

of the different varieties of *M. venenosa*, *Enneacentrus fulvus*, and *E. guttatus*.

The color of *camelopardalis* is thus described by Poey: "All the body, except the head above and below and the lips, is covered by round spots of the diameter of a pea, a diameter apart, closer together on the head, of a reddish brown, therefore scarcely distinguishable on the back from the ground color; they are redder on the head; the dorsal is reddish, with a violet border; the anal dark violet, with two interrupted bands of clear violet; pectorals of a dirty vermilion; ventrals bluish black, paler behind; caudal dusky bluish, with many elongate violet spots between the rays; vertical fins and ventrals with a whitish border; iris vermilion, inside of mouth red."

A single specimen of the brown form of this species was seen at Havana, where it is known as "Bonací Gato."

4. Mycteroperca interstitialis.

Serranus interstitialis, Poey, Memorias ii, 127, 1860 (Cuba).

Trisotropis interstitialis, Poey, Synopsis Pisc. Cubens., 1868, 285; Poey, Ann. Lyc. Nat. Hist. N. Y., 308, 1869; Poey, Enum. Pisc. Cubens., 14, 1875.

? *Trisotropis chlorostomus*, Poey, Repertorio, ii, 231, 1868; Poey, Synopsis Pisc. Cubens., 285, 1868; Poey, Ann. Lyc. Nat. Hist. N. Y., 308, 1869 (Cuba).

Habitat.—Coast of Cuba.

Head, $2\frac{2}{3}$ ($3\frac{2}{5}$); depth, $3\frac{1}{2}$ ($4\frac{3}{7}$). D. XI, 16–17; A. III, 12. Scales, 23–120–x. Length, $11\frac{1}{2}$ inches.

Body more slender than in any other of the species here described; its greatest width half its greatest depth; head not very acute, the anterior profile rather strongly curved, somewhat gibbous above the eyes; mouth moderate, the maxillary reaching slightly beyond eye, $2\frac{1}{4}$ in head; teeth in narrow bands; two strong canines in the front of each jaw, those of the upper jaw nearly vertical; nostrils rather small, subequal, nearly round; interorbital space slightly concave, its width $5\frac{1}{2}$ in head; the orbital ridges elevated; eye large, $5\frac{1}{2}$ in head. Preopercle with a moderate emargination, its angle a little salient, with slightly coarser teeth; gill-rakers rather few, about 17 on lower part of anterior arch.

Scales rather small, chiefly cycloid.

Dorsal spines rather slender and weak, the outline of the fin gently convex; the second spine slightly longer than the tenth, the third and fourth longest, $3\frac{1}{8}$ in head; anal rather high, posteriorly rounded, 2 in head; caudal fin a little concave, the inner rays $1\frac{1}{6}$ in outer, which are $1\frac{3}{8}$ in head; pectorals reaching tips of ventrals, 2 in head. Pylorić cœca, 12 (Poey).

Color of body in spirits dark brown, in life with small darker spots surrounded by reticulations of the ground color. Dorsal and caudal fins dusky, their margins blackish; anal dusky, edged with bluish black; ventrals dusky, edged with bluish black, its rays lighter; pectorals dusky, a well-defined moustache above the maxillary.

Fins edged with dull orange in life, this color disappearing in spirits.

This species is rather common in the markets of Havana, where several specimens were obtained, none of them very large.

This is probably the species to which Professor Poey has given the name of *interstitialis*, although our specimens do not altogether agree with his descriptions.

We have ventured to refer Poey's *chlorostomus* to the synonymy of *interstitialis*, the principal distinctive character given ("spots rounded, smaller, and wider apart") being one of little importance.

Nothing is known of the distribution of this species outside of the waters of Cuba.

5. Mycteroperca calliura.

Mycteroperca calliura, Poey, Repertorio, 1867, i, 181, 309 (Cuba).
Hist. N. Y., ix, 307, 1869; Poey, Enum. Pisc. Cubens., 14, 1875.
Trisotropis calliurus, Poey, Syn. Pis. Cubens., 284, 1868; Poey, Ann. Lyc. Nat.

Habitat.—Cuba.

This species is known to us only from the accounts of Professor Poey. The original type is a stuffed skin of a young specimen now preserved in the University of Havana.

If Poey's description is correct, the species would appear to be well distinguished from its relatives, although it resembles *microlepis* and *interstitialis*.

The following is the substance of the original description of this species:

Individual described 500 millimeters long. The height is contained $3\frac{4}{5}$ times in the total length from tip of mandible to tips of caudal; the head measured in the same way to the membranous tip of the opercle enters $3\frac{2}{5}$ times in the same length. The eye is moderately high, its diameter 6 in head from tip of upper jaw, or $1\frac{2}{3}$ in length of snout. At a distance of $\frac{2}{5}$ of a diameter from the eye the nostrils are placed. These form a broad aperture divided by a vertical membrane, the anterior part smaller, communicating with the posterior, which contains the two olfactory openings, one above the other; the upper in a concavity, the lower in a prominence.

The maxillary extends to the vertical from the middle of the eye; measured with the compass it reaches the posterior part of the orbit; the lower jaw projects much beyond the upper. The outer teeth are conic, well separated, with one or two canines in front on each side, moderately large; below a small canine on each side; within are the smaller teeth arranged as usual in this genus.

The preopercle has the ascending branch curved, very finely denticulated, forming a re-entrant angle before coming outward in a pronounced salient angle with strong denticulations. The opercle has the median spine large, the others very small.

D. XI, 17; A. III, 11; P. 17. Scales, 25–130–40 to 50.

The dorsal is lower than the anal; the 5th and 6th rays from the last are the highest. The first dorsal spine is nearly half the second, which

is nearly equal to the third. The caudal is truncate with two prolonged points. The other rays each end in a point, there being a deep notch of the membrane between each one and its neighbor.

Scales small, ciliated, covering most of the head, as usual.

Color, dark brownish olive with rounded spots of yellowish, obscure in some specimens; lips yellowish; iris olive; fins dark brown, darker on the edges of the vertical fins, with a pale edge along the soft dorsal and anal. The caudal has a beautiful green cross-band, preceding the denticulations of its extremity. The pectoral towards the center is yellowish, followed by a dark color coming from the coloration of the rays; all the posterior margin is green.

Pyloric cœca 12, large and firm.

Later, Poey describes the color as clear yellowish brown, with brown spots. A living specimen showed eight narrow dusky cross-bands, which disappeared after death.

D. XI, 17; A. III, 12. Third soft ray of the anal more prolonged.

6. Mycteroperca dimidiata.

Serranus dimidiatus, Poey, Memorias Cuba, 1860, ii, 129 (Cuba).

Trisotropis dimidiatus, Poey, Syn. Pisc. Cubens., 1868, 285; Poey, Ann. Lyc. Nat. Hist. N. Y., 1869, 308; Poey, Enum. Pisc. Cubens., 1875, 14.

Habitat.—Cuba.

This species is known only from Poey's accounts. The coloration as given by Poey is unlike that of any other species known to us. We therefore admit it as distinct, but regard it as a doubtful species.

7. Epinephelus microlepis. *Gag; Aguaji.*

Serranus acutirostris, Cuvier & Valenciennes, Hist. Nat. Poiss., ix, 432 (Charleston: no descr.; not type); Dekay, New York Fauna, Fishes, 1842, 23 (Charleston).

Trisotropis acutirostris, Gill. Rept. U. S. Fish. Comm., 1871–72, 806. (Name only.)

Trisotropis brunneus, Goode & Bean, Proc. U. S. Nat. Mus., 1879, 115, 143. (Pensacola; not of Poey.)

Trisotropis microlepis, Goode & Bean, Proc. U. S. Nat. Mus., 1879, 141 (West Florida); Goode & Bean, Proc. U. S. Nat. Mus., 1882, 238 (no descr.); Jordan & Gilbert, Syn. Fish. N. A., 1883, 538 (copied).

Epinephelus microlepis, Jordan, Proc. U. S. Nat. Mus., 1884, 124. (Key West; Cedar Keys.)

Trisotropis stomias, Goode & Bean, MSS.; Jordan & Gilbert, Proc. U. S. Nat. Mus., 1882, 273 (Pensacola); Goode & Bean, Proc. U. S. Nat. Mus., 1882, 427 (Pensacola; Key West); Jordan & Gilbert, Syn. Fish. N. A., 918, 971; Bean, Cat. Fishes Exhib. London, 1883, 61 (Pensacola).

Head, $2\frac{5}{8}$ ($3\frac{2}{9}$); depth, $3\frac{1}{2}$ ($4\frac{2}{9}$). D. XI, 17; A. III, 11. Scales, 26–145–x. Length, $11\frac{1}{2}$ inches.

Body comparatively elongate, compressed, its greatest width $2\frac{1}{4}$ in greatest depth. Head long, rather pointed, compressed, its anterior profile comparatively evenly curved and not much arched; mouth comparatively large, the maxillary extending (in the young a foot long) slightly beyond the eye, its length $2\frac{1}{5}$ in head. In the adult the max-

illary is proportionately longer, about half head; teeth in rather narrow bands, each jaw with two canines, the upper rather large and directed little forward, the lower rather small. Eye moderate, $6\frac{1}{2}$ in head (young). Interorbital space slightly convex, 7 in head. Gill-rakers few, about 12 on lower part of anterior arch. Preopercle with a shallow emargination above the angle, which is somewhat salient and armed with radiating serræ considerably larger than those on the upper limb, which are very fine. Nostrils small, rounded, subequal, not very close together.

Scales very small, chiefly cycloid.

Dorsal spines comparatively slender and weak, the outline of the fin gently convex; the tenth spine is about as long as second; third and fourth spines longest, $3\frac{1}{2}$ in head. Caudal distinctly lunate, the outer rays one-fifth longer than the inner, $1\frac{3}{4}$ in head. Anal rather high, its posterior margin convex, the longest ray $2\frac{1}{3}$ in head, the spines small, graduated. Pectoral reaching slightly beyond tips of ventrals, 2 in head.

The shade of color of this species is variable, those found in shallow water being lighter and more variegated.

Specimens from deep water are plain brownish gray, paler below, with no distinct spots or rivulations, but faint traces of darker spotting, which disappear in spirits. A faint moustache. Lips not green. Dorsal dark olive, the tip of soft part blue-black, its edge narrowly white. Caudal black, with bright blue shadings, its edge white. Anal deep indigo blue, olive at base, its edge white. Pectorals olive, dusky toward the tip. Ventrals blackish, its first ray tipped with white.

Specimens of the same size as the above, taken in shallow water among grass, are green-olive, mottled with darker green, and variously clouded, but without spots or rivulations. Moustache black. Fins colored as above, distinctly bluish. Radiating streaks of bluish from eye; all the blue markings of life fade, more or less, into dusky or grayish in spirits.

This species ranges farther north on our coasts than any other, except *Epinephelus morio*. It reaches a weight of about fifty pounds. Around the coast of Florida it is generally abundant on the banks and reefs and is an important food-fish. It is known to the fishermen of Florida as the "Gag," and occasionally as "Black" Grouper, but the latter name is usually confined to *M. bonaci* or *E. nigritus*. This species is sent in considerable numbers from Key West to the markets of Havana, where it is known as *Aguaji*. It does not appear to have been mentioned by Poey, although he could not have failed to observe it. All of the specimens seen by Professor Jordan in the markets of Havana came from Key West. We do not know, therefore, that the species occurs in the West Indies. There is no doubt of the identity of *microlepis* and *stomias*, the former based on young specimens in poor condition, the latter on adults well preserved.

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8. Mycteroperca scirenga. *Abadejo; Scirenga.*

Sparus scirenga, Rafinesque, Caratteri di Alcuni Nuovi Generi, etc., 1810, 50 (Palermo).

Serranus acutirostris, Cuv. & Val., ii, 286, 1828 (Brazil); Valenciennes, "Ichthyologie des Iles Canaries, pl. III, f. 1" (Canary Islands; Messina); Guichenot, Explor. Sci. Algérie, Zool., v, 35, 1850 (Algiers); Günther, i, 135, 1859; Steindachner, Ichth. Beitr., xii, 5, 1882 (identified with *S. undulosus*).

Cerna acutirostris, Doderlein, Rivista del Genere Epinephelus o Cerna, 1883, 59 (Palermo; description and full synonymy).

Serranus undulosus, Cuv. & Val., ii, 295, 1828 (Brazil); Steindachner, Ichth. Beitr., v, 127, 1876 (Rio Janeiro); Günther, i, 143, 1859 (said to have "pectorals yellow"); Steindachner, Ichth. Beitr., xii, 1882, 3 (Brazil; Port Said; Beiruth; Messina).

Trisotropis undulosus, Poey, Ann. Lyc. Nat. Hist. N. Y., 1869, 305 (after one of the original types).

Serranus fuscus, Lowe, "Trans. Cambr. Philos. Soc., vi, 196, 1836" (Madeira); Günther, i, 1859, 134 (Madeira; Canary Islands); Steindachner, Ichthyol. Bericht., iv, 1867, 14, taf. 2 (Cadiz; Teneriffe).

Serranus emarginatus, Valenciennes, "Ichthyol. Iles Canaries, 10, 1835 to '50" (Canary Is.).

Serranus tinca, Cantraine, "Nouv. Mém. Acad. Brux. 1831, xi."

Cerna macrogenis, Sassi, "Descr. Genova e il Genovasato, i, 139," 1846.

Epinephelus chalinius, Cope, Trans. Am. Philos. Soc., 1871, 465 (St. Martin's.)

Habitat.—West Indies; Brazil; islands of the Eastern Atlantic; Mediterranean.

We have not had the material for a full study of this species, and we have relied chiefly on the accounts of it given by Dr. Steindachner, in the arrangement of its synonymy. Our diagnosis is drawn from the figure of "*Serranus fuscus*" given by Steindachner in his Ichthyologische Berichte. The names *undulosus*, *fuscus*, *emarginatus*, *tinca*, and *macrogenis* are considered by Steindachner to be synonymous with *acutirostris*. We have ventured with a little doubt to add *chalinius* of Cope. The type of this species, examined by us, is very immature, only four inches in length. It has the coloration of *M. scirenga*, the caudal truncate, about 90 scales in the lateral line, a salient angle to the preopercle, and the anal rays III, 10. There is little doubt that it is this species rather than *M. bonaci*.

Dr. Bean informs us that specimens of this species in the British Museum have about twice as many gill-rakers (30 on lower part of anterior arch), as are found in any of the other species of *Mycteroperca* which we have examined.

Since the above was written we have received from our friend Dr. H. E. Sauvage, of the Muséum d'Histoire Naturelle at Paris, the following account of the original types of *Serranus acutirostris* and *Serranus undulosus*, which tends to confirm the identification of these species made by Dr. Steindachner.

We translate from the letter of Dr. Sauvage:

"The type of *Serranus acutirostris* C. V. which is now before me comes from Brazil, by Delalande. It is m. 0.360 in length.

"D. XI, 16; A. III, 11. L. lat. 95.

"Height of the body contained 4 times; length of head $3\frac{1}{2}$ in the total length. Caudal scarcely emarginate. Third anal spine longer and a little stronger than second. Lower jaw longer than upper; maxillary reaching to opposite posterior margin of eye. Muzzle $1\frac{2}{3}$ times length of eye, the diameter of which is $5\frac{2}{3}$ times in the length of the head. Preopercle finely denticulate, the teeth at the angle stronger. Color uniform reddish brown."

A drawing accompanying this shows the maxillary to be half the length of the head, and the angle of the preopercle somewhat salient.

"*Serranus undulosus* is so near to the other species that, except for the presence of undulating lines, I cannot distinguish the two. The caudal is, however, a little more convex."

This specimen is doubtless the young of the one called *acutirostris*.

Professor Doderlein, in his recent "Rivista del genere *Epinephelus*," calls attention to the probable identity of *Sparus scirenga* with *Serranus acutirostris*. Rafinesque's description is of little value, but he says that his species is the fish called "*Scirenga*" at Palermo. According to Doderlein, the "*Scirenga*" of the Palermo market is the *M. acutirostris*. There seems, then, to be no doubt as to the species which Rafinesque had in mind. It appears therefore necessary to substitute *scirenga* for *acutirostris*.

9. Mycteroperca bonaci. *Bonaci arara; Black Grouper.*

Bonaci arara, Parra, Peces y Crustaceos de Cuba, 1787, tab. 16, f. 2 (Havana).

Serranus bonaci, Poey, Memorias de Cuba, 1860, ii, 129 (Cuba).

Trisotropis bonaci, Poey, Syn. Pisc. Cubens., 1868, 283; Poey, Ann. Lyc. Nat. Hist. N. Y., 306, 1869; Poey, Enum. Pisc. Cubens., 1875, 13.

Epinephelus bonaci, Jordan, Proc. U. S. Nat. Mus., 1884, 124 (Key West).

Serranus brunneus, Poey, Mem. Cuba, 1860, ii, 131; Poey, Repertorio Fis.-Nat., ii, 156, 1868.

Trisotropis brunneus, Poey, Syn. Pisc. Cub., 1868, 284; Poey, Ann. Lyc. Nat. Hist. N. Y., 305, 1869; Poey, Enum. Pisc. Cubens., 1875, 13; Poey, Bull. U. S. Fish Comm., 118, 1882 (Key West); Jordan & Gilbert, Syn. Fish. N. A., 1883, 538 (copied).

Serranus arará, Poey, Memorias Cuba, ii, 1860, 132 (Cuba; not of Cuv. & Val.); Steindachner, Ichthyol. Notizen, 1867, vi, 42.

Serranus decimalis, Poey, Memorias Cuba, ii, 1860, 138 (Cuba).

Serranus cyclopomatus, Poey, Mem. Cuba, ii, 1860, 353 (Cuba).

Serranus latepictus, Poey, Mem. Cuba, ii, 1860, 353 (Cuba).

Trisotropis aguaji, Poey, Repertorio, ii, 229, 1868; Poey, Synopsis, 1868, 284; Poey, Ann. Lyc. Nat. Hist. N.Y., ix, 306; Poey, Enumeratio, 14.

Habitat.—West Indies, north to Key West.

Head, $2\frac{3}{4}$ ($3\frac{2}{5}$); depth, $3\frac{1}{4}$ (4). D. XI, 17; A. III, 12. Scales, 22–110–x. Length, $11\frac{1}{2}$ inches.

Body comparatively slender, a little more robust than in *M. microlepis*, its breadth $2\frac{1}{3}$ in its depth; head moderate, rather pointed, its an-

terior profile little curved; mouth rather large, the maxillary reaching slightly beyond eye, $2\frac{1}{5}$ in head (in young), proportionately longer in adult. Teeth in rather narrow bands; two rather strong canines directed little forward in front of each jaw; eye moderate, 6 in head (young). Interorbital space slightly convex, its width 6 in head. Preopercle forming a regular curve without salient angle, the emargination near the angle very slight. Nostrils small, roundish, subequal; not very close together. Gill-rakers few, about 13 on lower part of anterior arch.

Scales rather small, chiefly cycloid; dorsal spines comparatively slender and weak, the outline of the fin gently convex; the tenth spine about as long as second; third and fourth spines longest, $3\frac{1}{3}$ in head; caudal fin truncate when spread open, its outer rays a very little produced, $1\frac{3}{5}$ in head; anal rather high and rounded, its longest rays $2\frac{1}{4}$ in head; pectoral reaching slightly beyond tips of ventrals, $1\frac{7}{10}$ in head. Pyloric cœca 15 (Poey).

Color in life, deep orange-brown, more olive on the back, clouded above by paler or grayish; sides and belly marked everywhere by reticulations of pearly gray, which surround roundish or oblong spots of the ground color, the pale streaks being largely horizontal on the sides. Sides of the head similarly marked, the spots smaller, bronze-brown, the reticulations decidedly bluish. Six or seven spots in a straight line between eye and preopercle, the spots having nearly the diameter of the pupil. Spots on the body mostly covering 4 to 6 scales, all of them larger than a scale. Dorsal olive-brown, somewhat mottled. Caudal similar to dorsal, narrowly edged with whitish; anal similar, with two or three rows of bluish spots, its tips blackish with a narrow whitish edge. Pectorals olive-brown, plain. Ventrals blackish, the rays bluish. Mouth not green, the lips olive, barred with bluish. Iris reddish.

A large specimen, about $2\frac{1}{2}$ feet in length, seen at Key West, retained the same general coloration, the bronze spots and rivulations being distinct and not smaller than in the young. In spirits the orange-brown of the body is replaced by dark brown, and the blue reticulations of the head, by gray; all the markings become more faint. Pyloric cœca 17 (Poey).

The above description is from partly grown specimens. A very large Grouper, lately obtained by Mr. Silas Stearns, at Havana, appears to belong to the same species, although the coloration is strikingly different through the much smaller size of the spots. The following is a detailed description of the Pensacola specimen, of which the skin is preserved in spirits. We regard it, for the present, as a subspecies of *E. bonaci*.

DESCRIPTION OF VAR. XANTHOSTICTA (VAR NOV.).

Head, 3 ($3\frac{1}{4}$); depth, 3 ($3\frac{1}{2}$). D. XI, 17; A. III, 12. Scales, 22–110–x. Length, 46 inches.

Body comparatively robust, formed much as in *E. venenosus*. Head large, its anterior profile little curved, the snout not very acute, $3\frac{2}{3}$ in

head. Mouth large, the maxillary reaching to beyond eye, $1\frac{9}{10}$ in head (in adult). Teeth in moderate bands; two strong, nearly vertical canines in front of each jaw. Eye $9\frac{1}{3}$ in head (adult).

Interorbital space strongly convex, its breadth $4\frac{1}{2}$ in head. Preopercle forming a regular curve, without salient angle, the emargination near its angle very slight. Nostrils roundish, close together, subequal.

Scales rather small, chiefly cycloid. Dorsal spines rather slender and low, the third spine $3\frac{2}{5}$ in head. Caudal fin subtruncate when spread open, its outer rays very slightly produced, $1\frac{7}{8}$ in head; the rays of the fin projecting slightly beyond the membranes. Anal high and rounded, its longest rays $2\frac{4}{5}$ in head. Pectoral reaching slightly beyond tips of ventrals, $2\frac{2}{7}$ in head.

Color of fresh specimen, rather bright dark-purplish gray, scarcely paler below, rather darkest along top of head and sides of back. Chin dark. A few obscure paler rivulations on belly, sides, and especially on breast. Head and body everywhere covered very evenly with round, close-set spots of a bright bronze orange. These spots are mostly broader than the interspaces, and have an average diameter about equal to that of a nostril. These are obscure on lower part of head and body, but there are traces of such spots almost everywhere. The spots are most distinct on head, and they cover the dark part of the eye. On the lower jaw the spots are oblong and more closely set. About 23 spots in a straight line from eye to angle of preopercle. Spots on the body are usually arranged one to each scale, the average diameter being considerably less than that of a scale. None of them on the body are as large as the scale. The bases of the pectoral, anal, and caudal are similarly spotted. Dorsal dark olive-brown, the distal half of the soft dorsal black. Caudal and anal colored like the soft dorsal, the black on the caudal paler, the latter without the narrow pale edge of the dorsal and anal. Pectorals and ventrals brownish, blackish towards the tips, the pectoral with a grayish edge and no yellow. A dusky moustache on preorbital, along edge of maxillary; membrane of region concealed by maxillary covered with very bright orange spots. Angle of mouth on lower jaw largely yellowish-green, with some dull orange.

Mycteroperca bonaci is abundant about Key West, where it is known as Black Grouper, being the only species to which that name is applied. It reaches a weight of 50 pounds. The young are taken along the shore in the seine. The species is about equally common at Havana, where it is known as *Bonaci ararά*.

Poey has already recognized his *ararά*, *decimalis*, *cyclopomatus*, and *latepictus* as synonyms of his *brunneus*. But we see nothing of any importance to distinguish his *bonaci* from *brunneus*, and adopt the former name as the oldest for the species, which, notwithstanding its abundance, does not seem to have been named by earlier authors. Poey's *Trisotropis aguaji*, distinguished only by the olivaceous yellow color of the base of the soft dorsal, is almost certainly the same. If our identification

of the large specimen from Pensacola is correct, very old specimens may exhibit material differences in coloration, due to the subdivision of the bronze spots and the disappearance of the rivulations. Similar changes certainly do take place in *M. venenosa*. It is more likely, however, that the *xanthosticta*, like the *cardinalis*, *camelopardalis*, &c., is a varietal form, inhabiting deeper water.

10. Mycteroperca reticulata.

Trisotropis reticulatus, Gill, Proc. Ac. Nat. Sci. Phila., 1865, 105 (Barbadoes).

Habitat.—Barbadoes; one specimen known.

Head, $2\frac{4}{5}$ ($3\frac{1}{5}$); depth, $3\frac{2}{3}$ ($4\frac{1}{3}$). D. XI, 17; A. III, 11. Scales, 18–123–x. Length (6708, Barbadoes), 19 inches.

Body moderately elongate, rather strongly compressed. Head large, the anterior profile rather more strongly curved than in most species, somewhat gibbous above the eyes; snout not very acute, $3\frac{4}{5}$ in head. Mouth very large, oblique, the maxillary extending to beyond the eyes; its length $2\frac{1}{8}$ in head. Canines moderate, nearly vertical. Lower jaw strongly projecting; eye $6\frac{2}{3}$ in head. Posterior nostril much larger than anterior; the two close together and close to eye. Interorbital space strongly convex; its breadth $5\frac{2}{3}$ in head. Preopercle forming a regular curve, without salient angle or conspicious emargination. Gill-rakers very short and broad; about 6 developed on lower half of arch, besides about 3 rudiments.

Scales rather small, chiefly cycloid. Dorsal spines rather slender, the second, third, and fourth subequal, $3\frac{1}{2}$ in head. Soft dorsal slightly angulated, the tenth ray slightly longer than the others, 3 in head. Caudal somewhat lunate, the outer rays $1\frac{9}{10}$ in head. Anal high, slightly angulated, the largest rays $2\frac{2}{3}$ in head. Anal spines short, graduated. Pectorals reaching somewhat beyond tips of ventrals, 2 in head.

Color, in spirits, olivaceous; the head covered with very distinct honeycomb-like reticulations of darker olive, surrounding pale spots, from the size of the nostril to that of the pupil; body showing traces of such spots. Fins plain, the soft dorsal and anal edged with blackish.

The above description is taken from the original type of the species collected at Barbadoes by Dr. Gill. No second specimen is yet known. The species appears to be distinct from *M. bonaci* and *M. venenosa*, although certainly very closely related to the latter. Possibly some of Poey's names, referred by us to the synonymy of *bonaci*, may prove to to belong to the present species.

11. Mycteroperca venenosa. *Rock-fish; Yellow-finned Grouper; Bonaci cardenal; Bonaci de Piedra.*

a. Var. *venenosa* (gray variety).

Perca marina venenosa, the Rock-fish, Catesby, Fishes Carolina, &c., tab. 5 (Bahamas).

Perca venenosa, Linnæus, Syst. Nat., x, 292, 1758 (after Catesby); *ibid.*, xii, 486; Gmelin, Syst. Nat., 1788, 1318, (copied); Bloch & Schneider, Syst. Ichth., 1801, 92 (copied).

Epinephelus venenosus, Jordan, Proc. U. S. Nat. Mus., 1884, 124 (Key West).
Serranus petrosus, Poey, Memorias Cuba, ii, 136, 1860 (Havana); Poey, Repertorio, ii, 165, 1868.
Trisotropis petrosus, Poey, Ann. Lyc. Nat. Hist. N. Y., 1869, 304; Poey, Enum. Pisc. Cubens., 1875, 13; Poey, Bull. U. S. Fish Comm., 1882, 118 (Key West); Jordan & Gilbert, Syn. Fish. N. A., 1883, 918 (copied).
Trisotropis undulosus, Goode, Bull. U. S. Nat. Mus., v, 55, 1876 (Bermudas; excl. syn.).

b. Var. *guttata* (*cardinalis*) (red variety).

Bonaci cardenal, Parra, Peces y Crustaceos Cuba, 1787, 29, lam. xvi (Havana).
Johnius guttatus, Bloch & Schneider, Syst. Ichthyol., 1801, 77 (after Parra).
Trisotropis guttatus, Goode, Bull. U. S. Nat. Mus., v, 1876, 56 (Bermudas).
Serranus cardinalis, Cuv. & Val., ii, 1828, 378 (after Parra); Poey, Repertorio, i, 1867, 200.
Trisotropis cardinalis, Poey, Ann. Lyc. Nat. Hist. N. Y., 1869, 303 (Cuba); Poey, Enum. Pisc. Cubens., 1875, 13.
Serranus rupestris, Cuv. & Val., ix, 437, 1833 (San Domingo); Günther, i, 145, 1859 (copied).

Habitat.—West Indies, Florida Keys, Bermudas; the red variety (*guttata=cardinalis*) not yet known from our coasts.

A. DESCRIPTION OF AN ADULT SPECIMEN FROM KEY WEST, VAR. VENENOSUS.

Head, $2\frac{3}{5}$ ($3\frac{1}{2}$); depth, 3 ($3\frac{4}{5}$). D. XI, 16; A. III, 11. Scales, 24–125–x. Length, $20\frac{1}{2}$ inches.

Body rather robust, not strongly compressed; head rather bluntish, its anterior profile a little uneven. Mouth large, the maxillary reaching much beyond eye, 2 in head; teeth in rather narrow bands, each jaw with two strong canines, which are not directed forwards; nostrils moderate, close together, the posterior largest. Eye small, 7 in head (adult). Interorbital space flat, broad, 5 in head. Preopercle without salient angle, its emargination slight.

Scales rather small, chiefly cycloid. Dorsal spines not very weak, the outline of the fin gently convex, the second spine about as long as tenth, the highest 3 in head. Caudal fin lunate, the inner rays $1\frac{1}{3}$ in outer, which are $1\frac{1}{2}$ in head. Anal rounded, rather low, the longest rays $2\frac{1}{2}$ in head. Pectorals reaching well beyond tips of ventrals, 2 in head. Pyloric cœca 15 to 20 (Poey).

Color in life (adult) clear olive green, livid bluish or pearly below, (grayish below in spirits). Upper parts marked everywhere with broad reticulations, and curved blotches of bright clear light green; these reticulations most distinct on the upper part of the head; a greenish blotch on shoulder before dorsal. Entire body and head covered with round orange-brown spots (becoming brown in spirits) about as large as the nostrils, the centers darkest; these spots largest and least numerous above. Angle of mouth orange within. Iris orange. Breast slightly rosy, grayish in spirits. Dorsal olive brown with whitish blotches and a very few dark spots. Soft dorsal, anal, caudal, and ventrals broadly edged with blackish, the caudal with more spots, these fins otherwise

colored like the dorsal fin. Pectoral olivaceous, its tip yellow, its base spotted.

No young specimens of this variety have been examined, but probably the same changes in color will be found that occur in the "Bonaci cardenal."

B. DESCRIPTION OF SPECIMENS FROM HAVANA (VAR. GUTTATA OR CARDINALIS).

Head, $2\frac{2}{3}$ ($3\frac{2}{5}$); depth, 3 ($3\frac{4}{5}$). D. XI, 16; A. III, 11. Scales, 24–121–x.

Body rather short and deep, rather strongly compressed. Head rather bluntish, the anterior profile rather strongly and regularly arched; mouth rather large, the maxillary reaching past the eye; $2\frac{1}{8}$ in head (in young). Lower jaw projecting, but rather less prominent than usual in *Mycteroperca*. Teeth moderate, in rather narrow bands; both jaws with two moderate canines in front, the upper larger and not directed forwards. Nostrils close together, subequal. Eye small, $5\frac{1}{2}$ in head (young). Interorbital space flattish or slightly concave, its width 6 in head. Preopercle without salient angle, its emargination very slight, the teeth below the notch slightly enlarged.

Scales rather small, chiefly cycloid. Dorsal spines not very slender, the second spine as long as tenth; the third and fourth highest, $3\frac{1}{6}$ in head. Caudal fin slightly lunate, the outer rays little longer than inner, $1\frac{2}{5}$ in head. Anal rather high, somewhat rounded, the longest rays $1\frac{5}{6}$ in head. Pectoral about reaching tips of ventrals, $1\frac{3}{4}$ in head.

The color varies much with age and probably also with the depth of water.

a. Color in life of an adult example about $2\frac{1}{2}$ feet in length: Very dark everywhere, sparsely covered with round spots, which are black on the body and red on the belly. Mouth, red within. Pectoral, broadly edged with orange red, otherwise plain. No other bright colors anywhere. Soft parts of vertical fins largely black.

b. Color in life of an example about 2 feet in length: Intense scarlet-red above, grayer below; above, small black spots; below, larger red ones. Base of dorsal and caudal deep red. Edge of dorsal, caudal, and anal, black. Pectoral, spotted at base, then blackish, thence broadly yellow.

c. Color in life of specimens 8 inches in length: Scarlet-brown above, the color varying from vermilion to gray, becoming grayish in spirits; sides light gray; the ground color forming rivulations around quadrate blotches of black. Belly and lower part of head scarlet. Blotches above and on sides, black; the upper ocellated with red; those on sides, below lateral line, presenting the appearance of interrupted horizontal bands; the blotches below all vermilion, separated by rivulations of ground color. Lower jaw yellowish, with red blotches. Pectorals yellow; the fins otherwise all marbled with red and black; the vertical fins with grayish rivulations, edged with black and tipped with white. In spirits the scarlet and red above become gray, the vermilion below,

whitish. With age the large quadrate blotches on the side and below gradually break up into smaller spots, and in time the coloration of *a* and *b* is reached.

This differs from the coloration of the adult of var. *venenosa* chiefly in the shade of the ground color, which is scarlet instead of gray.

We are unable to detect any difference between *M. venenosa* and *M. guttata*, except that of color, the former having no red, except the spots, while the latter has the ground color chiefly red. We believe this difference to be dependent either on the depth of the water or (which seems more likely) the character of the bottom.

The synonymy otherwise needs no special remark, the name *venenosa* having clear priority over all others. If *Mycteroperca* be regarded as a genus distinct from *Epinephelus*, the name *guttata* should supersede *cardinalis* for the red variety.

Two specimens of the gray variety (*venenosa*) were obtained by Professor Jordan at Key West, where the species is known to the fishermen as Rock-fish. It is also rather common at Havana, where it is called *Bonaci de Piedra*. The red variety is a common food-fish at Havana, and is called by the fishermen now, as in the time of Parra, *Bonaci cardenal*.

12. Mycteroperca olfax.

Serranus olfax, Jenyns, Zool. of the Beagle, Fishes, p. 9, pl. 4, 1842 (Galapagos Archipelago); Günther, Cat. Fishes Brit. Mus., i, 153 (copied).
Mycteroperca (*olfax*), Gill, Proc. Ac. Nat. Sci, Phila., 1863, 80 (generic diagnosis).

Habitat.—Galapagos Islands.

This fish is known to us only from the account given by Dr. Jenyns. The peculiar structure of the nostrils, as described by Jenyns, and as used originally to define the genus *Mycteroperca*, is said to be merely a deformity due to the faulty preparation of the stuffed skin of the type. It is probable that the small anterior nostril was overlooked by Jenyns, and the fleshy septum within the large posterior nostril was taken by him for the line of separation between the nostrils. In the form of the spinous dorsal this species diverges from the other members of the genus, much as *Epinephelus morio* does from the other *Epinepheli*, but it seems to be peculiar in no other respect.

The statement of Jenyns that the maxillary is naked is probably incorrect.

II.—Genus PROMICROPS.

PROMICROPS, (Gill MSS.) Poey, Synopsis Piscium Cubensium, 1868, 287 (*guasa=itaiara*).
ITAIARA, Vaillant & Bocourt, Mission Scientifique au Mexique, 1875 (*itaiara*).

This genus is well distinguished by the peculiarities of its cranium, as well as by the structure of its lateral line. One species only is certainly known, a tropical fish of very large size, bearing a strong resemblance to the species of *Stercolepis*.

ANALYSIS OF SPECIES OF PROMICROPS.

a. Color olivaceous with darker cross-shades, which fade with age; head and body with round black spots; preopercle without strong tooth below angle; dorsal spines low, the edge of the spinous dorsal scarcely convex; second anal spine as long as third; profile slightly concave above eye; scales moderate (about 95).

ITAIARA, 13.

13. Promicrops itaiara. *Guasa; Jew-fish; Merou.*

Cugupuguacu, Marcgrave, Hist. Brazil, &c., 1648, 169 (Brazil).

Itaiara, Marcgrave, Hist. Brazil, &c., 1648 (Brazil).

? *Perca guttata*, L., Syst. Nat., 1758, x, 292 (in part: after Marcgrave, &c.).

Serranus itaiara, Lichtenstein, Acta Berolin., 1820–1, 278 (Brazil); Cuvier & Valenciennes, ii, 1828, 376 (Brazil); Peters, Berliner Monatsber., 1865, 110 (identification with *S. galeus* M. & H.); Steindachner, Ichth. Beitr., v, 127, 1876.

Serranus (*Itaiara*) *itaiara*, Vaillant & Bocourt, Miss. Sci. au Mexique., 1875, 90, pl. ii, f. 4 (identification with *S. quinquefasciatus*. Brazil; Tanesco; Mexico; Pacific).

Epinephelus itaiara, Jordan, Proc. U. S. Nat. Mus., 1884, 124 (Key West).

Serranus galeus, Müller & Troschel, Schomburgk's Reise in Brit. Guiana, 621, about 1842; Günther, i, 1859, 130 (Brazil).

Epinephelus galeus, Jordan, Proc. Ac. Nat. Sci. Phila., 1883. 285 (identification of type of *Serranus galeus*).

Serranus guasa, Poey, Memorias Cuba, ii, 1860, 141, 354, tab. 13, f. 8 (Cuba).

Promicrops guasa, Poey, Rep., ii, 154, 1868; Poey, Synopsis Pisc. Cub., 287, 1868; Poey, Enum. Pisc. Cubens., 1875, 18; Poey, Bull. U. S. Fish Comm., 1882, 118 (Key West); Jordan & Gilbert, Syn. Fishes N. A., 1883, 542 (copied); Gill, Rep. U. S. Fish Comm., 1871–2, 806 (name only).

Epinephelus guasa, Goode & Bean, Proc. U. S. Nat. Mus., 1882, 238 (name only).

Serranus quinquefasciatus, Bocourt, Ann. Sci. Nat., 1868, 223 (Nagualate; Pacific coast of Guatemala).

Epinephelus quinquefasciatus, Jordan & Gilbert, Bull. U. S. Fish Comm., 1882, 106, 110, 112 (Mazatlan; Panama; Punta Arenas). No descr.

Habitat.—Both coasts of tropical America north to Florida, and Gulf of California south to Brazil.

Head, $2\frac{3}{5}$ ($3\frac{2}{5}$); depth, $3\frac{1}{10}$ ($3\frac{9}{10}$). D. XI, 16; A. III, 8. Scales, 20–95–x. Length, 16 inches.

Body more robust than in any other of our species, its greatest breadth $1\frac{2}{3}$ in the depth. Head very large, unusually broad, anteriorly obtuse, its profile depressed or slightly concave above the eye, convex at the nape. Snout very short, $4\frac{3}{4}$ in head; lower jaw projecting. Mouth large, the maxillary, even in the young, reaching much beyond the eye, 2 in head. Teeth in broad bands, those of the outer series somewhat enlarged, the canines very small, scarcely differentiated, but present. Eye very small, 7 in head (in young). Interorbital area flattish, very broad, its width 5 in head. Nostrils subequal, roundish, close to the eye. Preopercle convex, with a slight emargination, the angle a little prominent, with somewhat larger teeth. Opercular spines small and blunt. Gill-rakers short and thick, few (about 12) in number.

Scales comparatively large, mostly ctenoid. Scales of the lateral line, each with 4 to 6 conspicuous radiating ridges separated by furrows.

Dorsal spines low and strong, the third, fourth, and fifth subequal, 4 in head, the outline of the [fin] scarcely convex; second spine lower than

tenth; caudal fin rounded, its outer rays very much shortened, little more than half the length of the middle rays, which are $1\frac{1}{2}$ in head. Anal rounded, its longest rays $2\frac{1}{3}$ in head. Second anal spine about as long as third and a little stronger, $4\frac{3}{5}$ in head. Pectoral reaching a little beyond tips of ventrals, $1\frac{2}{3}$ in head. Ventrals 2. Pyloric cœca excessively numerous and finely divided. Color of a young specimen in life pale olive green, slightly yellowish on breast and lower jaw. Body with five cross-bars of dark olive green, with irregular but rather sharply defined edges, and extending on the dorsal and anal fin; two under spinous dorsal, two between soft dorsal and anal, one on caudal peduncle; these bars partially or wholly disappear in spirits. A dark blotch at nape; two shades down and backward from eye. A bar at base of caudal. Round blackish spots smaller than pupil of different sizes scattered over the whole of head and nuchal region; a few along back; these smallest on upper part of head, largest on back and lower parts of sides of head. Breast and belly plain. Dorsal fin olive, with dark clouds like the body, a few spots on spines and tips of soft rays. Caudal much clouded with dark, which forms series of spots on the hinder parts, these spots smallest and best defined posteriorly. Anal similar to caudal. Pectorals light olive, profusely covered with large dark spots. Ventrals similar to pectorals, with fewer spots. Tips of pectorals and caudal slightly reddish. In spirits the dark bands and blotches of body are more or less faded.

A very large specimen of this species, about 5 feet in length, seen by Professor Jordan at Key West, had the same general coloration as the young examples, the bars becoming much fainter and less definite.

This species reaches a larger size than any other of the *Epinepheli*, its weight being probably not less than 600 to 800 pounds. The adult fishes bear a strong resemblance to the gigantic Jew-fish of California (*Stereolepis gigas*), a species which we consider a near ally of *P. itaiara*.

We are not able to distinguish specimens of the Pacific coast form (*quinquefasciatus*) from the Atlantic *itaiara*. The bands in the former seem rather more sharply defined, but no other difference is evident. The types of *quinquefasciatus* have been also compared with the specimens called *itaiara* by Cuvier and Valenciennes, by Vaillant, and the two are regarded by him as identical. The type of Lichtenstein's *Serranus itaiara* has been examined by Peters, and pronounced identical with *Serranus galeus* of Müller and Troschel. Professor Jordan has examined the original types of Poey's *guasa* and Müller and Troschel's *galeus*. There is therefore apparently no room for doubt as to the identity of *itaiara*, *galeus*, and *guasa*.

As to the question of the pertinence to this species of the Linnæan name *Perca guttata*, see the discussion under the head of *Enneacentrus guttatus*.

The peculiarities in the scales of this species have led Vaillant and Bocourt to regard it as the type of a distinct subgenus, which they have called *Itaiara*.

The differences in the form of the head have led Gill and Poey also to make it the type of a generic division, which they have named *Promicrops*. The species should undoubtedly be considered as forming a distinct group, for which the name *Promicrops* must be retained.

This fish is known in Florida and in the West Indies as Jew-fish to English-speaking fishermen, and as *Guasa* to those that speak Spanish.

III.—Genus EPINEPHELUS.

EPINEPHELUS, Bloch, Ichthyologia, 1793 (*ruber, afer,* &c.).
CEPHALOPHOLIS, Bloch & Schneider, Syst. Ichthyol., 1801, 311 (*argus*).
CYNICHTHYS, Swainson, Nat. Hist. Classn. Fishes, ii, 1839, 201 (*flavo-purpuratus*).
CROMILEPTES, Swainson, Nat. Hist. Classn. Fishes, ii, 1839, 201 (*gigas,* &c.).
CERNA, Bonaparte, Introduzione Iconogr. Fauna Italica, 1841 (*gigas*).
HYPORTHODUS, Gill, Proc. Ac. Nat. Sci. Phila., 1861, 237 (*flavicauda=niveatus*).
SCHISTORUS, Gill, Proc. Ac. Nat. Sci. Phila., 1862, 237 (*mystacinus*).
LABROPERCA, Gill, Proc. Ac. Nat. Sci. Phila., 1863, 80 (*labriformis*).
MERUS, Poey, Ann. Lyc. Nat. Hist. N. Y., about 1869 (*gigas,* &c.).
PRIACANTHICHTHYS, Day, Proc. Zool. Soc. London, 1868 (young).
CERNA, Doderlein, Rivista delle Specie del genere *Epinephelus* o *Cerna*, 1873 (*gigas*).
SERRANUS sp., auct. (*nec typus*).

This group is richer in species and more widely distributed over the earth than any of the others. It is also undoubtedly more diverse in its composition. We do not, however, think that any further subdivision among the American species is desirable. The species most aberrant are *E. morio*, with lunate caudal and emarginate dorsal; *E. mystacinus*, with plectroid armature to the preopercle and other peculiarities, and *E. analogus*, with ten dorsal spines only. *E. nivcatus* and *E. mystacinus* also differ from most of the others in having an increased number of pyloric cœca. Possibly the latter species should be placed in or near *Alphestes*, but it more resembles *Epinephelus*.

ANALYSIS OF SPECIES OF EPINEPHELUS.

a. Dorsal spines eleven.
  b. Second dorsal spine higher than third or fourth.
    c. Caudal fin rounded; interorbital area unusually broad; preopercle with a stout tooth below its angle; second anal spine much shorter than third; scales small (about 115); color dusky, without distinct markings anywhere in the adult; size very large, approaching that of *Promicrops*.....NIGRITUS, 14.
    cc. Caudal fin lunate; preopercular angle little salient, without enlarged teeth; color brown, clouded with whitish; lower parts flushed with orange-red; small dark spots about eye; vertical fins broadly edged with blue-black.....MORIO, 15.
  bb. Second dorsal spine lower than third and fourth; caudal fin rounded.
    d. Preopercle with two or three small teeth curved forward below its angle; scales mostly ctenoid; head large; pyloric cœca in increased number (*Schistorus*); second and third anal spines about equal in length: color brownish, with about eight darker cross bands; dark bands radiating from eye; a dark moustache above the maxillary; a dark blotch on back of tail.
MYSTACINUS, 16.
    dd. Preopercle without distinct antrorse plectroid armature.
      e. Body not covered with round red or orange spots; spots, if any, whitish or bluish.

f. Caudal peduncle with a large quadrate black blotch above (sometimes obsolete in the young, and in very old examples).

g. Eye surrounded by conspicuous dark brown points; body with irregular darker cross-bars; preopercular angle little salient; third dorsal spine highest, 2½ in head; scales moderate (about 100); lower jaw little projecting; vertical fins broadly edged with yellow ..... STRIATUS, 17.

gg. Eye not surrounded by dark points; sides with steel blue or whitish spots and blotches; no dark cross-bars; lower jaw strongly projecting.

h. Angle of preopercle not salient, its serræ weak; pale spots on body scattered, those on breast distinct ..... SELLICAUDA, 18.

hh. Angle of preopercle salient, with strong teeth; pale spots on body regularly arranged; those on breast indistinct; pyloric cæca numerous ..... NIVEATUS, 19.

ff. Caudal peduncle without saddle-like blotch above.

i. Body, head, and fins dark brown, covered with small, pearly white stellate spots; lower parts reddish; preopercle without salient angle; fins not edged with black.. DRUMMOND-HAYI, 20.

ii. Body and fins without stellate spots.

j. Vertical fins edged with red; color brown, variegated with yellowish brown, black, and white; "external appearance labroid"; scales rather large, those below lateral line ciliated, those above and on belly smooth; second dorsal spine about as long as third; preopercle obscurely serrate, without prominent angle ..... LABRIFORMIS, 21.

jj. Vertical fins broadly edged with black; color reddish brown, nearly plain; preopercle with strong teeth at its angle; dorsal spines subequal, rather low; interorbital space of moderate width ..... GIGAS, 22.

ee. Body and head covered with red or orange spots (brown or blackish in spirits).

k. Vertical fins broadly edged with blue-black, their bases unspotted; body without pale spots; the orange spots rather small; lower jaw little projecting; preopercle with salient angle; size small ..... APUA, 23

kk. Vertical fins without dark edge; their bases spotted like the body; body with large pale spots besides the orange spots; young with large black blotches at base of dorsal; lower jaw strongly projecting; angle of preopercle not salient; form robust, ASCENSIONIS, 24.

aa. Dorsal spines ten; caudal rounded; body with faint dark cross shades, and many round dark orange spots, these extending on the fins; vertical fins not edged with black; preopercle without salient angle; lower jaw strongly projecting ..... ANALOGUS, 25.

14. Epinephelus nigritus. *Black Grouper; Jew-fish.*

Serranus nigritus, Holbrook, Ichth. S. Car., 1859, 173, pl. xxv, f. ii, and 1860 (Charleston); Günther, i, 1859, 134 (copied).

Epinephelus nigritus, Gill, Cat. Fish. E. Coast U. S., 1861, 30 (name only); Goode & Bean, Proc. U. S. Nat. Mus., 1878, 182; Goode & Bean, *op. cit.*, 1879, 139 (Pensacola); Goode, *op. cit.*, 1879, 115 (Indian River, Florida); Jordan & Gilbert, Syn. Fish. N. A., 1883, 541 (copied).

Habitat.—South Carolina and Florida.

This species reaches a very large size. It has been rarely obtained by naturalists, and is as yet unknown from the West Indies. On the

Florida coast it appears to be confounded with *E. itaiara*, under the name of Jew-fish or *Guasa*.

We have had no opportunity of studying it. Dr. Bean has preserved for us a section of the skin of a large individual weighing 300 pounds, a cast of which is in the United States National Museum. The scales of the lateral line are of the ordinary type, not showing the peculiarities of *Promicrops itaiara*.

The following table of measurements of this specimen has been kindly furnished us by Dr. Bean.

Species: *Epinephelus nigritus; current number of specimen,* 34883; *locality, off Block Island.*

	Millimeters.
Anterior nostril from tip of snout	136
Width of interorbital area	135
Length of maxillary	241
Intermaxillary	214
Length of mandible	327
Diameter of orbit	51
Length of first spine	48
Length of second spine	422+
Length of third spine	330
Length of last spine	64
Length of antecedent spine of soft dorsal	90
Length of longest ray	181
Length of last ray	106
Length of first spine of anal	23
Length of second spine	68
Length of third spine	70
Length of longest ray	203
Length of last ray	120
Dorsal	X, 15
Anal	III, 9
Ventral	I, 5
Gill-rakers	10+14

Weight, 300 pounds.

15. Epinephelus morio. *Red Grouper; Cherna Americana; Cherna de Vivero.*

Serranus morio, Cuv. &Val., Hist. Nat. Poiss., ii, 285,1828 ("New York" and San Domingo); Dekay, New York Fauna, Fishes, 1842, 23 (copied); Günther, i, 142, 1859 (Cuba); Steindachner, Ichth. Beitr., v, 127, 1876 (Rio Janeiro); Poey, Repertorio, i, 197.

Epinephelus morio, Gill, Cat. Fish. E. Coast, 1861, 28 (name only); Poey, Syn. Pisc. Cub., 1868, 285 (Havana); Poey, Enum. Pisc. Cub., 15; Jordan & Gilbert, Proc. U. S. Nat. Mus., 1878, 379 (Beaufort, N. C.); Goode, *op. cit.,* 1879, 115 (St. John's River; Indian River); Goode & Bean, *op. cit.,* 1879, 139 (Pensacola); Bean, *op. cit.,* 1880, 99 (Bermuda); Poey, Anal. Hist. Nat., 319, 1881 (Puerto Rico); Goode & Bean, *op. cit.,* 1882, 238 (name only); Jordan & Gilbert, *op. cit.,* 1882, 272 (Pensacola); Poey, Bull. U. S. Fish Comm., 1882, 118 (Key West); Jordan & Gilbert, Syn. Fish. N. A., 1883, 510; Bean, Cat. Fishes Exhib. London, 60, 1883 (Key West, Fla.); Jordan, Proc. U. S. Nat. Mus., 1884, 124 (Key West).

Serranus erythrogaster, Dekay, New York Fauna, Fishes, 1842, 21, tab. 19 (Florida); "Storer, Synopsis, 1846, 30" (copied); Holbrook, "Ichth. S. Carol., 1860. 29, pl. 5, fig. 2" (Charleston); Günther, i, 133 (copied).

Epinephelus erythrogaster, Gill, Cat. Fishes East Coast U. S., 30, 1861 (name only).

Serranus remotus, Poey, Memorias Cuba, ii, 140, 1860 (Havana).

Habitat.—Atlantic coast of America; Virginia to Rio Janeiro.

Head, $2\frac{1}{2}$ ($3\frac{1}{10}$); depth, $2\frac{4}{5}$ ($3\frac{2}{5}$). D. XI, 16; A. III, 8, or III. 9. Scales, 24–140–x. Length, 11 inches.

Body comparatively deep and compressed, highest under front of spinous dorsal, its greatest width $2\frac{1}{2}$ in greatest depth. Head large, moderately pointed, the anterior profile rather steep and nearly straight. Mouth rather large, the maxillary reaching slightly beyond eye, its length $2\frac{1}{5}$ in head. Lower jaw not strongly projecting. Teeth moderate, in rather narrow bands; two moderate canines in the front of each jaw, the lower smaller. Eye large, 5 in head (young). Interorbital space narrow, its width $7\frac{1}{2}$ in head, the outline of the bone (under the flesh) transversely concave. Nostrils small, round, subequal. Preopercle moderately serrate, its angle slightly salient; teeth at the angle a little enlarged. Gill-rakers rather slender, about 15 below the angle.

Scales small, mostly ctenoid. Dorsal spines high, slender but pungent, the first less than half the second, which is highest, $2\frac{1}{3}$ in head; the outline of the fin thence almost straight to the tenth spine, which is $1\frac{3}{4}$ in the second; soft dorsal not elevated; caudal fin lunate, the outer rays a little produced, $1\frac{2}{3}$ in the head; caudal peduncle comparatively slender; soft part of anal rounded, its longest ray $2\frac{3}{4}$ in head; second anal spine somewhat stronger but not longer than third, $4\frac{1}{6}$ in head. Pectorals reaching slightly beyond tips of ventrals, $1\frac{4}{5}$ in head. Pyloric cœca 25 (Poey).

Color in life, olive-gray or olive-brown, clouded with paler olive, with no clear red shades except on jaws and lower part of sides of head and breast, these regions being usualy a salmon-color. Besides these, very irregular rounded blotches of grayish white over the body; preorbital, suborbital region, and snout, with numerous round points of dark orange-brown, most numerous on preorbital, these points brown in spirits; inside of mouth posteriorly bright orange; iris gilt.

Vertical fins colored like the body, the shades from the body extending on them; soft dorsal, anal, and caudal, with a broad ridge of blue-black, with a narrow whitish edge; spinous dorsal narrowly edged with blackish; ventrals, slightly dusky; pectorals, light olive.

With age, this species becomes more and more of a flesh-red, especially below and on mouth; the pale spots and blotches are less distinct in old examples.

This species is the most abundant of the genus on our coasts, where it is known almost universally as Red Grouper. It appears to range farther northward than any other, except perhaps *Mycteroperca mi-*

crolepis. It reaches a smaller size than the latter. In the Havana market it is also common, most of the individuals, however, being brought from the Florida Keys. For this reason it is known in Havana as *Cherna Americana* or *Cherna de Vivero*, the common "*Cherna*" being there *E. striatus*.

16. **Epinephelus mystacinus.** *Cherna de lo Alto.*

Serranus mystacinus, Poey, Memorias Cuba, i, 52, 1851, tab. 10, f. 1 (Cuba); Günther, i, 109, 1859 (South America).

Schistorus mystacinus, Poey, Repertorio, ii, 154, 1868; Poey, Synopsis Pisc. Cubens., 1868, 287; Poey, Enumeratio Pisc. Cubens., 1875, 18.

Habitat.—West Indies.

Head, $2\frac{3}{7}$ ($3\frac{1}{6}$); depth, $2\frac{8}{9}$ ($3\frac{2}{3}$). D. XI, 15; A. III, 9. Scales, 22–105. Length, 10 inches.

Body oblong, rather deep, somewhat compressed; its thickness $2\frac{2}{5}$ in its depth. Head large, rather obtuse, the anterior profile little convex and not steep. Mouth moderate, the broad maxillary reaching posterior border of eye, $2\frac{1}{4}$ in head. Teeth rather strong; those below mostly biserial, those above in a narrow band. Canines small, shorter than the depressible teeth of the inner series, those of the lower jaw scarcely differentiated. Lower jaw little projecting. Posterior nostril larger than anterior, nearly round. Eye large, $4\frac{1}{2}$ in head. Interorbital space slightly convex, 6 in head. Preopercle rather sharply serrate, the posterior limb nearly vertical, not emarginate, the angle nearly a right angle, its serrations considerably enlarged, coarse, variable in form, some of the lower ones usually hooked fowards. Lower limb straight, its edge otherwise entire.

Opercle with three distinct spines, larger than in any other of our species. Gill-rakers short and thick, much as in *E. afer*, about 15 below the angle.

Scales mostly ctenoid, those on head small; none visible on the maxillary and few on lower jaw. Lower jaw with 5 or 6 large mucous pores on each side, more distinct than in our other species.

Dorsal spines rather strong and high, the first nearly half the second, which is considerably higher than the tenth; third spine longest, $2\frac{2}{3}$ in head; second, fourth, fifth, and sixth, but little shorter; soft dorsal rather high. Caudal rounded, its longest ray $1\frac{2}{3}$ in head; anal rounded, its longest ray $2\frac{1}{6}$ in head. Second anal spine stronger than third, which is of the same length, $3\frac{3}{5}$ in head. Pectorals reaching slightly beyond tips of ventrals, $1\frac{2}{3}$ in head. Pyloric cœca many (Poey).

Color in life, dull olive-brown, the body grayish brown crossed by 8 bands of dark olive-brown, the one on caudal peduncle broader than the others, darkest on back of tail; these bands which are more conspicuous in life than those of other species of this genus become faint in spirits. A dark moustache along edge of maxillary. Three dark bands across cheek, almost disappearing in spirits. Dorsal dull olive, the bands of sides extending on the scaly parts; caudal and anal dull

olive; the anal, dusky in spirits; ventrals, blackish. Pectorals, light olive-brown. Mouth, bluish within.

This species seems to inhabit deeper water than most of the foregoing and to reach but a small size. One specimen was obtained by Professor Jordan at Havana, where it was called *Cherna de lo Alto*. Although this species is a somewhat peculiar one, we cannot regard it as the type of a distinct genus (*Schistorus*).

According to Poey, the skull of this species does not deviate from the usual type in *Epinephelus*.

The strong resemblance of *Epinephelus mystacinus* to the Japanese *E. susuki*, C. & V. (=*Serranus octocinctus*, Temminck & Schlegel) has been noticed by Dr. Günther.

17. Epinephelus striatus. *Nassau Grouper; Cherna criolla; Hamlet.*

Cherna, Parra, Peces y Crustaceos Cuba, 1787, 50, lam. xxiv (Cuba).

Anthias striatus, Bloch, Ichth., ix, 109, tab. 324, 1792 (on a figure by Plumier); Bloch & Schneider, Syst. Ichthyol., 1801, 305 (copied).

Lutjanus striatus, Lacépède, Hist. Nat. Poiss., iv, 324, 1803 (copied).

Serranus striatus, Cuv. & Val., ii, 1828, 288 (Gulf of Mexico); Storer, "Syn. Fish. N. A., 1846, 27" (copied); Guichenot, Ramon de la Sagra's Hist. Cuba, Poiss., 1850, 12 (Cuba): Günther, i, 1859, 110 (Cuba; Mexico; Puerto Cabello; Bahia); Poey, Repertorio, i, 198, 1867; Vaillant & Bocourt, Mission Scientifique au Mexique, 1875–'76 (Cuba; San Domingo; Martinique; Jamaica).

Epinephelus striatus, Gill, Proc. Ac. Nat. Sci. Phila., 1865, 105 (name only); Poey, Repertorio, ii, 285, 1868 (Havana); Poey, Syn. Pisc. Cub., 1868, 310; Poey, Enum. Pisc. Cub., 1875, 15; Goode, Bull. U. S. Nat. Mus., v, 1876, 57 (Bermudas); Cope, Trans. Am. Phil. Soc., 1871, 466 (New Providence; St. Croix); Bean, Proc. U. S. Nat. Mus., 1880, 99 (Bermuda); Poey, Anales Hist. Nat., 319, 1881 (Puerto Rico); Jordan & Gilbert, Syn. Fish. N. A., 1883, 918; Poey, Bull. U. S. Fish Comm., 1882, 118; Jordan, Proc. U. S. Nat. Mus., 1884, 125 (Key West).

Anthias cherna, Bloch & Schneider, Syst. Ichth., 1801, 310 (after Parra).

Sparus chrysomelanurus, Lacépède, iv, 1803, 160 (on a copy of Plumier's figure).

Habitat.–West Indies, Key West, and Bermudas to Bahia.

Head, $2\frac{4}{7}$ ($3\frac{1}{4}$); depth, $2\frac{7}{9}$. D. XI, 17; A. III, 8. Scales, 21–100–x. Length, 11 inches.

Body rather deep, not strongly compressed; its greatest width, $2\frac{2}{5}$ in depth. Head somewhat pointed; the anterior profile nearly straight to the front of the dorsal. Mouth moderate, the lower jaw little projecting, the maxillary reaching posterior border of eye, $2\frac{1}{3}$ in head. Teeth in moderate bands; two moderate canines in front of each jaw, the lower smallest. Nostrils close together, the posterior a little the larger, ovate. Eye rather large, $5\frac{1}{2}$ in head (young). Interorbital space narrow, flattish, or somewhat concave, $8\frac{1}{2}$ in head. Angle of preopercle slightly salient; a shallow notch above it; the teeth at the angle somewhat larger. Gill-rakers slender, about 16 below the angle.

Scales moderate, strongly ctenoid.

Dorsal spines of moderate strength, higher than in most species; the second much higher than tenth, the third highest, $2\frac{1}{2}$ in head; soft

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dorsal rather high; caudal rounded, $1\frac{5}{7}$ in head. Soft anal rounded, the largest ray $2\frac{1}{4}$ in head. Second anal spine stronger than third and about as long, 4 in head. Pectorals reaching tips of ventrals, $1\frac{7}{9}$ in head.

Color in life, rather pale olivaceous gray, paler below, and with obscure whitish clouds along sides. Body with about 4 vertical bars, very irregular and undulating, of an olive-brown color, darker on the back, and all extending on the dorsal fin; a square blotch of jet black on back of tail; a band of dark olive through eye and on snout, meeting its fellow on shoulder, just before dorsal; another on median line of snout, forking opposite front of eye, the two bands extending backward parallel and ceasing abruptly on occiput without reaching the other band; dark shades radiating from eye below; a ring of deep brown or blackish points around eye, the upper ones on eye; a deep orange-red stripe on lower edge of preorbital; mouth within partly orange; lower parts of head and breast tinged with orange and with coppery cloudings; vertical fins colored like the parts of the body nearest them; edge of both dorsals yellow; caudal and anal tipped with orange yellow; ventrals blackish, faintly yellowish at tips; pectorals, chiefly light orange, dusky at base.

The bands and dark markings of body become fainter in old examples of this species, and almost disappear in alcoholic specimens.

This species is one of the commonest food-fishes both at Key West and Havana, being called at the former place Nassau Grouper, and at the latter *Cherna criolla*, or simply *Cherna*. It reaches a considerable size, probably not less than that of *E. morio*. The great majority of those seen in the markets are, however, small, less than 18 inches in length.

18. Epinephelus sellicauda.

Epinephelus sellicauda, Gill, Proc. Ac. Nat. Sci. Phila., 1862, 250 (Cape San Lucas); Jor. & Gilb., Proc. U. S. Nat. Mus., 1881, 229 (Socorro Island); Jor. & Gilb., *op. cit.*, 1882, 360 (Cape San Lucas); Jor. & Gilb., *op. cit.*, 1882, 371 (Colima); Jor. & Gilb., *op. cit.*, 1882, 625 (Panama); Jor. & Gilb., Bull. U. S. Fish Comm., 1882, 107 (Mazatlan).

Serranus sellicauda, Günther, Fishes Centr. Amer., 1869, 409 (Panama); Steindachner, Ichth. Beitr., iv, 1871, 5 (Panama).

Epinephelus ordinatus, Cope, Trans. Am. Philos. Soc., 1871, 466 (Panama).

Habitat.—Pacific coast of tropical America; Cape San Lucas to Panama, generally common.

Head, $2\frac{1}{2}$ ($3\frac{1}{8}$); depth, 3 ($3\frac{1}{2}$). D. XI, 15; A. III, 8. Scales, 16–93–x. Length (28213, Revillagedos), $11\frac{1}{2}$ inches.

Body oblong, moderately compressed, the back somewhat elevated. Head rather slender and sharp, anteriorly pointed, the profile nearly straight from the tip of the lower jaw to the base of the dorsal. Snout sharp, $3\frac{4}{5}$ in head. Lower jaw strongly projecting. Mouth moderate,

the maxillary extending to slightly beyond eye, its length $2\frac{1}{5}$ in head. Canines moderate; about equal in the two jaws. Nostrils subequal, roundish. Eye large, $5\frac{1}{2}$ in head. Interorbital space narrow, convex, its width 9 in head. Preopercle weakly and bluntly serrate, its angle evenly rounded, without evident notch or salient angle. Gill-rakers rather short, about 16 on lower limb of arch.

Scales moderate, etenoid. Dorsal spines strong, the fourth, fifth, and sixth longest; 3 in head. Soft dorsal not very high. Caudal slightly convex, $2\frac{1}{3}$ in head. Longest anal ray $2\frac{2}{3}$ in head. Second anal spine about as long as third, $4\frac{1}{8}$ in head. Pectorals short, reaching little past tips of ventrals, $1\frac{4}{5}$ in head.

Color, in spirits, dark brown everywhere, on head, body, and fins much clouded with roundish pale blotches; these most distinct on breast and lower parts of head. A conspicuous black blotch on back of caudal peduncle. Fins rather pale, darker toward their edges, spotted like the body, the spots smaller and fainter.

This species is generally common on the Pacific coast of tropical America, where it is a food-fish of some importance. It bears considerable resemblance to *E. niveatus* of the Atlantic.

19. Epinephelus niveatus.

Serranus niveatus, Cuv. & Val., ii, 1828, 380 (Brazil); Castelnau, Anim. nouv. ou rares de l'Amér. du Sud, Poiss., pl. i, f. 2 (coast of Brazil); Günther, i, 130 (copied); Poey, Repertorio, i, 202.

Epinephelus niveatus, Poey, Synopsis Pisc. Cubens., 1868, 286 (Havana); Poey, Enum. Pisc. Cubens., 1875, 15; Jordan & Gilbert, Syn. Fish. N. A., 1883, 541.

? Serranus margaritifer, Günther, Cat. Fish. Brit. Mus., i, 1859, 131 (South America).

Serranus conspersus, Poey, Memorias Cuba, ii, 139, 1860 (Havana); Poey, Repert., ii, 157, 1868.

Hyporthodus flavicauda, Gill, Proc. Ac. Nat. Sci. Phila., 1861, 98 (young specimen, taken at Newport, R. I.); Cope, Proc. Ac. Nat. Sci. Phila., 1870, 119 (same specimen).

? Epinephelus flavolimbatus, Poey, Repertorio, i, 1867, 183; ii, 1868, 157 (Cuba); Poey, Synopsis Pisc. Cubens., 1868, 286; Poey, Enum. Pisc. Cub., 1875, 15.

Habitat.—West Indies, Brazil, Aspinwall (Gilbert), occasionally straying northward.

Head, $2\frac{1}{3}$ (3), depth, $2\frac{9}{10}$ ($3\frac{1}{2}$). D. XI, 14; A. III, 9. Length (9804, Havana), $6\frac{1}{4}$ inches.

Body oblong, compressed, the back elevated; the anterior profile somewhat convex, the snout short, rather sharp, its length $3\frac{3}{4}$ in head. Mouth large, the maxillary extending to below posterior margin of eye, its length 2 in head. Canines rather strong, especially in upper jaw. Lower jaw considerably projecting. Eye rather large. Preopercle with its angle decidedly salient, armed with stronger teeth, the emargination above the angle slight. Interorbital space flattish, its width $7\frac{1}{2}$ in head. Gill-rakers moderate, about 15 on lower limb of arch.

Scales moderate.

Dorsal spines rather high, the fourth about $2\frac{3}{5}$ in head. Soft dorsal of moderate height. Caudal truncate, 2 in head. Anal moderate, its sec-

ond spine about as long as third, $3\frac{2}{3}$ in head; longest soft ray $2\frac{1}{3}$. Pectorals not reaching to the tips of the long ventrals, $1\frac{2}{10}$ in head.

Color of young specimen in alcohol brown, with round whitish spots on the body rather smaller than the pupil, rather regularly arranged in vertical and horizontal series; about 5 in a horizontal row and 4 in a vertical one. These rows show some irregularities, and some smaller spots are mingled with the larger ones. No distinct spots on breast. A very large black blotch on upper part of caudal peduncle, much larger than in *E. sellicauda*, and extending to below lateral line; a dark moustache above edge of maxillary; fins nearly plain, probably yellowish in life, the dorsal with a median row of round dusky spots on the membranes.

We have never seen this species in life, and have for study at present only a young example sent by Professor Poey to the National Museum. There seems to be considerable variation in its coloration, dependent on age and on other circumstances.

The *Serranus margaritifer* seems to be the same species.

We know nothing of *Epinephelus flavolimbatus** Poey, except from Professor Poey's descriptions. From these we infer that he has correctly identified this as the adult of this species, of which his *niveatus* and *conspersus* are the young. In the *flavolimbatus* Poey counts but seven pyloric cœca, while a larger number has been assigned to *E. niveatus*. The caudal saddle seems to disappear with age. It is also apparently wanting in the very young.

20. Epinephelus labriformis.

Serranus labriformis, Jenyns, "Zool. of Beagle, Fishes, p. 8, pl. 3, 1842 (Galapagos Archipelago)"; Günther, Cat. Fishes Brit. Mus., i, 152, 1859 (copied).

Habitat.—Galapagos Islands.

This species does not appear to have been taken since the voyage of the Beagle. There seems to be little to justify the epithet of "labriform," several times applied to it by Mr. Jenyns.

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* The following is a translation of the more important parts of the original description of *Epinephelus flavolimbatus*:

I have never seen this fish at Havana. It is found at Matanzas in one of the deepest parts of the bay.

Specimen described 705 millimeters long. Height, $3\frac{2}{3}$ in total length. Head, $3\frac{1}{6}$. D. XI, 14; A. III, 9; P. 18.

Eye 6 in head. Preoperele with strong spines at its angle. Maxillary reaching to below posterior part of orbit. Upper jaw with 2 short unequal canines on each side; lower jaw with one.

Second dorsal spine as long as third. Second spine of anal robust, $5\frac{1}{2}$ times in head. Caudal fin rather rounded than truncate.

Scales small, ciliated.

Color brownish or ashy pearly; head with green dashes like moustaches. Dorsal and paired fins pale violet, the former with its edge of a bright canary yellow, fading after the fifth soft ray. Pectoral also bordered with yellow on its entire margin, especially above; anal and caudal darker than the ground color. Pyloric cœca 7, short and firm.

Later, Professor Poey expresses his opinion that this species is the adult of *E. niveatus*.

21. Epinephelus gigas.

Perca gigas, Brünnich, "Ichthyol. Massiliensis, 65, No. 81," 1768 (Marseilles).
Holocentrus gigas, Bloch & Schneider, Syst. Ichth., 1801, 322 (copied).
Serranus gigas, Cuv. & Val., ii, 270, pl. xxxii, 1828; Günther, i, 132, 1859 (Madeira; Cape of Good Hope); Steindachner, Ichth. Berichte, iv, 11, 1867 (excl. syn. pars; Barcelona; Tangier; Lisbon; Teneriffe); Steindachner, Ichth. Beitr., xii, 6, 1882 (comparison with *Epinephelus caninus*); Steindachner, Ichth. Beitr., 1876, v. 127 (Canary Is.; Madeira; Cape Verde; Cape of Good Hope; Brazil); Day, British Fishes, 16, pl. v (south coast of England).
Cerna gigas, Doderlein, Rivista del Genere Epinephelus o Cerna, 1883, 10 (detailed description and synonymy).
Holocentrus merou, Lacépède, Hist. Nat. Poiss., iv, 377, 1803 (after Brünnich).
Serranus mentzeli, Cuv. & Val., ii, 291, 1828 (coast of Brazil); Günther, i, 140, 1859 (copied).
? *Serranus dichropterus*, Cuv. & Val., ii, 293, 1828 (Brazil; not type, which was from Japan, having been also the type of *Holocentrus ongus* Bloch).
Perca robusta, Couch, "Mag. Nat. Hist., 1832, v., 21, f. 7" (Polperro).
Serranus marginatus, Lowe, "Proc. Zool. Soc. Lond., 1833, 142" (Madeira).
Serranus fimbriatus, Lowe, "Trans. Cambr. Phil. Soc., 1836, p. 195, pl. i" (Madeira).
Serranus cirrioides, Capello, "Journ. Sci. Math., ii, 1867 156" (Portugal).
Serranus ongus, Günther, i, 1859, 142 (Bahia; not *Holocentrus ongus*, Bloch, a Japanese fish).
? *Epinephelus brachysomus*, Cope, Trans. Am. Phil. Soc. Phila., 1871, 466 (Rio Janeiro).

Habitat.—Coasts of Europe and Northern Africa; islands of the Eastern Atlantic; coast of Brazil.

We have not studied this species, and give most of the above synonymy on the authority of Dr. Steindachner, who has compared specimens from the Mediterranean with others from Brazil without finding any difference. Besides the several European names, Steindachner refers here the name *mentzeli*, C. & V. This identification seems probable. We have also ventured to refer here the Brazilian specimens of *Serranus dichropterus* of C. & V., and of *Serranus ongus*, Günther. According to Peters, the orginal *Holocentrus ongus* of Bloch, which specimen became also the type of *Serranus dichropterus*, C. & V., was a Japanese fish, *Serranus moara*, Temminck & Schlegel. The latter species should therefore stand as *Epinephelus ongus*.

The very young fish from Rio Janeiro in the museum of the Academy at Philadelphia, which is the type of Cope's *Epinephelus brachysomus*, seems to us to belong to this species. At any rate it is no other of those admitted here.

22. Epinephelus drummondhayi. *Hind; Speckled Hind; John Paw.*

Epinephelus drummond-hayi, Goode & Bean, Proc. U. S. Nat. Mus., 1878, 173, 174 (Pensacola; Bermuda); Goode & Bean, *op. cit.*, 1879, 115, 139 (Pensacola); Jordan & Gilbert, *op. cit.*, 1882, 272 (Pensacola); Jordan & Gilbert, Syn. Fish. N. A., 1883, 540 (copied).

Habitat.—Pensacola; Bermudas.

This species is not uncommon about Pensacola in rather deep water. Fishermen say that it is also occasionally taken at Key West, although

no specimens have yet been sent from there. It also occurs in the Bermudas, but no one has observed it anywhere in the West Indies. It does not reach a very large size. The "Speckled Hind" is a beautiful fish, the most attractive in coloration of any of our species of the genus.

As it has already been well described in these proceedings, it is not necessary to give a full account of it here.

23. Epinephelus apua. *Cabrilla; Red Hind.*

Pirati apia, Marcgrave, Hist. Bras., 158, 1648 (Brazil).

Cugupuguacu Brazil, the Hind, Catesby, Nat. Hist. Carol., &c., 1743, tab. 14 (Bahamas).

Cabrilla, Parra, Peces y Crustaceos Cuba, 1787 (Havana).

? *Perca guttata*, Linnæus, Syst. Nat., x, 1758, 292 (in part?; after Marcgrave, Sloane, Willoughby, Ray, and Catesby); ? Linnæus, Syst. Nat., xii, 485, 1766; ? Gmelin, Syst. Nat., 1788, 1315 (copied).

Epinephelus guttatus, Goode, Bull. U. S. Nat. Mus., v, 1876, 58 (Bermudas); Jordan & Gilbert, Syn. Fish. N. A., 1883, 919, 973 (specimens examined from Florida Keys); Bean, Proc. U. S. Nat. Mus., 1880, 99 (Bermuda; Florida).

? *Bodianus apua*, Bloch, Ichthyol., vii, 37, t. 229, 1790 (Brazil; erroneous; from a figure by Prince Maurice); Lacépède, iv, 1803, 296 (copied).

Serranus apua, Cuv. & Val., ii, 1828, 287 (Brazil; citing as synonym Piratiapia of Marcgrave); Günther, i, 140, 1859 (Jamaica); Steindachner, Ich. Notiz., vi, 43, 1867 (Barbadoes; Surinam); Günther, Shore Fishes, Challenger Exp. 1880, 6 (St. Thomas).

Epinephelus apua, Jordan & Gilbert, Syn. Fish. N. A., 973 (name only).

Lutjanus lunulatus (bis), Bloch & Schneider, Syst. Ichthyol., 1801, 329 (after *Cabrilla*, Parra).

Serranus lunulatus, Cuv. & Val., ii, 1828, 379 (after Parra); Steindachner, "Ichthyol. Mittheil., ix, 1866, 15"; Poey, Repertorio, i, 200.

Epinephelus lunulatus, Poey, Synopsis Pisc. Cubens., 1868, 286; Poey, Enum. Pisc. Cub., 1875, 16 (Havana); Cope, Trans. Am. Philos. Soc., 1871, 465 (St. Martin's; St. Kitt's; New Providence).

? *Bodianus marginatus*, Bloch & Schneider, Syst. Ichthyol., 1801, 331 (based on *Pirati apia*, of Marcgrave.)

Serranus catus, Cuv. & Val., ii, 373, 1828 (Martinique); Guichenot, Ramon de la Sagra, Cuba, ii, 13, 1850.

Serranus maculatus var. *catus*, Peters, Berliner Monatsber., 1865, 110 (Martinique; Barbadoes; Puerto Cabello).

Serranus arara, Cuv. & Val., ii, 1828, 377 (Havana; erroneously identified with *Bonaci ararà*, Parra); Poey, Repertorio, i, 200.

Serranus maculatus, Günther, i, 1859, 130 (West Indies; not *Perca maculatus*, Bloch); Vaillant & Bocourt, Mission Scientifique au Mexique, iv, 1875, 83 (Jamaica).

Epinephelus cubanus, Poey, Repert. Fis.-Nat. Cuba, i, 1867, 202 (Cuba); Poey, Syn. Pisc. Cub., 1868, 287; Poey, Enumeratio Pisc. Cub., 1875, 17.

Serranus maculatus var. *cubanus*, Peters, Berliner Monatsber., 1865, 110 (Cuba).

Habitat.—West Indies; Florida Keys; Bermudas; Brazil.

Head, $2\frac{1}{2}$ ($3\frac{1}{7}$); depth, $3\frac{1}{3}$ ($4\frac{1}{6}$). D. XI, 16; A. III 8. Scales 19–100–x. Length, 7 inches.

Body rather slender, moderately compressed, the back somewhat elevated, the greatest thickness of the body $2\frac{2}{5}$ in its greatest depth.

Head rather long and pointed; its anterior profile regularly and rather weakly arched. Mouth not very large, the maxillary reaching to below posterior margin of eye; its length $2\frac{1}{3}$ in head; lower jaw rather weak, its tip little projecting; teeth rather strong, in moderate bands; both jaws with two moderate, curved canines, those in the upper jaw largest. Eye large, $4\frac{1}{3}$ in head, rather longer than snout. Interorbital space very narrow, anteriorly concave, its width 11 in head; nostrils small, round, close together, the posterior largest. Preopercle weakly serrate, with a salient angle, which is armed with stronger teeth; a shallow emargination above the angle. Gill-rakers slender, of moderate length, about 15 developed below the angle.

Scales of moderate size, rather strongly ctenoid.

Dorsal spines rather slender but pungent, the second spine considerably higher than the tenth, the third and fourth longest, $2\frac{1}{2}$ in head; soft rays lower than the highest spines; caudal fin rounded, its length 2 in head. Anal rather high, posteriorly rounded, its longest soft rays $2\frac{2}{5}$ in head. Second anal spine somewhat stronger than third and rather longer, 3 in head. Pectorals rather narrow, reaching past tips of ventrals, $1\frac{2}{3}$ in head.

Color in life, light yellowish olive above, whitish below. Three broad oblique obscure bands of olive running upward and backward on sides; spots on body vivid scarlet red, those above a little darker, the edges of the scales being brown. Inside of mouth mostly pale, partly scarlet. Belly spotted. Dorsal olive-yellow, somewhat clouded, a few red spots on spinous dorsal. Soft dorsal broadly edged with black. Caudal yellowish, the posterior half black, its edge white. Anal like soft dorsal. Pectorals, light yellow, with rows of small scarlet spots. Ventrals red, blackish at tips. Branchiostegal membrane spotted like body. The olive bands on sides disappear in spirits, and the red spots above become brown, those below gray.

This is one of the smaller species of the genus, rarely exceeding 18 inches in length. It is very abundant in the Havana market, where it is known as *Cabrilla*.

The synonymy of this species has been very greatly complicated. Goode has adopted for it the name *Epinephelus guttatus*, erroneously crediting the name *guttatus* to Gmelin, and also erroneously stating that it is based on a figure by Catesby. The name *guttatus* dates from Linnæus, and is based on a number of figures given by prior authors, that of Catesby being one of these, but apparently not the one which should be regarded as the type of the species. For a discussion of the application of the name *Perca guttata*, see our remarks on the synonymy of *Enneacentrus guttatus*.

Of the remaining synonyms, *lunulatus*, *catus*, and *ararà* seem without much doubt to belong here. *Cubanus* is said to differ only in having the eyes smaller and the color of the body of a darker shade.

Poey has rejected the earlier name *apua*, on account of the erroneous figure given by Bloch (seven dorsal spines, &c.), and has preferred the name *lunulatus*. But this latter name seems to us an untenable one in any case, although no doubt exists as to its proper identification with this species. Bloch & Schneider describe a *Lutjanus lunulatus* Park. Then lower down on the same page, among the *species dubiæ*, is a second *Lutjanus lunulatus* based on the *Cabrilla* of Parra. By what accident or misprint this arrangement was brought about, we do not know. We do not, however, think that the second of these duplicated names should be accepted.

The figure of Bloch is exceedingly bad, showing nine dorsal spines, the body scarlet, marked with jet black spots, &c. The only fairly distinctive feature shown is that of the black margins of the vertical fins, and this feature is shown equally by *Mycteroperca venenosa guttata*, a species which in some respects agrees better with the figure than the present species does. If we reject the name *apua*, and its synonym, *marginatus*, as perhaps we ought to do, the oldest tenable name of the species will be *Epinephelus catus*, C. & V.

24. Epinephelus ascensionis. *Cabra Mora; Rock Hind.*

? *Pixa pixanga*, Marcgrave, Hist. Brazil, &c., 1648, 152 (Brazil; probably belongs here).

Trachinus ascensionis, Osbeck, Reise in China, &c., 1757, and English edition 1771, 96 (Ascension Island).

Epinephelus ascensionis, Jordan, Proc. U. S. Nat. Mus., 1884, 125 (Key West).

Trachinus punctatus or *Trachinus ascensionis*, Bonnaterre, Tableau Encycl. Method., 1788, 46 (after Osbeck).

? *Perca stellio*, Walbaum, Artedi Piscium, 1792, 349 (after Seba).

Holocentrus punctatus, Bloch, Ichthyol. (about 1792), viii, taf. 241 (very bad, after Marcgrave).

Epinephelus punctatus, Poey, Enum. Pisc. Cubens., 1875, 16 (Cuba); Poey, Anales Soc. Hist. Nat. Madrid, 1881, 319 (Madrid).

Perca maculata, Bloch, Ichthyol. (about 1795), taf. 313 (very bad; on a figure by Plumier; not *Holocentrus maculatus*, Bloch, tafel 242, an East Indian species of *Epinephelus=Holocentrus albofuscus*, Lac.).

Serranus maculatus, Peters, Berliner Monatsber., 1865, 109 (identification of *Perca maculata*, Bloch).

Trachinus osbeck, Lacépède, Hist. Nat. Poiss. (after Osbeck).

Sparus atlanticus, Lacépède, iv, 158, pl. 5, f. i, 1803 (based on a copy of Plumier's drawing).

Epinephelus atlanticus, Jordan & Gilbert, Syn. Fish. N. A., 1883, 918 and 973.

Serranus nigriculus, Cuv. & Val., ii, 375, 1828 (Martinique).

? *Serranus pixanga*, Cuv. & Val., ii, 383, 1828 (based on Marcgrave); Poey, Repertorio, i, 203.

Serranus impetiginosus, Müller & Troschel, Schomburgk's Hist. Barb., 665, 1848; Günther, i, 142, 1859 (Trinidad.); Günther, Proc. Zool. Soc. Lond., 1868, 225 (St. Helena; name only); Günther, Shore Fishes, Challenger, 1880, 5 (Ascension); Steindachner, Ichth. Beitr., v., 127, 1876 (Bahia; Maranhaõ).

Serranus maculatus var. *impetiginosus*, Peters, Berl. Monatsber., 1865, 110.

Epinephelus impetiginosus, Poey, Repertorio, i, 201; Poey, Syn. Pisc. Cubens., 286, 1868 (Cuba); Jordan & Gilbert, Syn. Fish. N. A., 1883.

Serranus capreolus, Poey, Memorias Cuba, ii, 1860, 145 (Cuba); Vaillant & Bocourt, Mission Scientifique au Mexique, 87 (Gulf of Mexico; Brazil; Ascension).

Epinephelus capreolus, Jordan & Gilbert, Syn. Fish. N. A., 1883, 539 (specimen from Key West described).

Serranus varius, Bocourt, Ann. Sci. Nat. Paris, 1868, 222 (Gulf of Mexico).

Habitat.—Florida Keys; West Indies; Brazil; Ascension Island; St. Helena.

Head, $2\frac{2}{5}$ ($2\frac{2}{10}$); depth, 3 ($3\frac{2}{3}$). D. XI, 17; A. III, 7, or III, 8. Scales, 15–100–x. Length, $12\frac{3}{4}$ inches.

Body comparatively robust, little compressed, the greatest thickness 2 in depth. Head, subconic, acute, its anterior profile straight from tip of snout to nape, thence slightly gibbous. Mouth rather large, the maxillary reaching rather beyond the eye, $2\frac{1}{3}$ in head. Lower jaw rather strongly projecting, more prominent than in any other of the Epinepheli. Teeth in rather broad bands, the canines short and stout, those of the lower jaw larger than those of the upper. Eye moderate, 6 in head. Interorbital space flattish, not very narrow, its width 6 in head. Nostrils subequal, roundish. Preopercle finely serrate, its outline strongly convex, with a very slight emargination. Gill-rakers rather short and thick, 15 below the angle.

Scales moderate, mostly strongly ctenoid. Dorsal spines rather strong, the third and fourth longest $3\frac{1}{5}$ in head, the outline of the fin little convex, the second spine about as long as tenth; caudal fin slightly rounded, 2 in head. Longest anal ray, $2\frac{1}{2}$. Second anal spine stronger than third, the length equal, $3\frac{5}{6}$ in head. Pectorals broad, reaching much beyond the tips of the short ventrals, $1\frac{4}{5}$ in head. Pyloric cœca 12 (Poey).

Color in life, olivaceous gray, with darker clouds. A number of irregular whitish blotches, roundish, mostly rather larger than pupil, scattered over different parts of the body; 5 roundish blackish blotches, ill-defined along sides of back, the 4 under the dorsal fin extending up on the fin, these disappearing with age. Head and body everywhere covered with round orange-brown spots of varying sizes, the centers more orange, the borders rather brown; the spots largest on breast, smallest on lips and upper parts, equally distinct everywhere. Mouth pale within its roof with red spots. Dorsal light olive, with rather sparse spots, colored like those of the body, but smaller. No dark edge to dorsal or anal. Numerous whitish spots on dorsal, especially on soft dorsal. Caudal pale olive, with some paler spots. Anal reddish, marked like dorsal, its spots larger. Basal half of pectoral similar, outer part plain olive. Ventrals pale, with orange spots. The orange-brown spots of body and head become brown in spirits.

This species is widely distributed through the Western Atlantic. It apparently does not reach a large size, although usually larger, as seen in the markets, than *apua*. It is not rare either at Havana or Key West, although in neither locality abundant. It is considered a finer

food-fish than any of the others. At Key West it is known as *Rock Hind*, and at Havana as *Cabra Mora*.

The synonymy of this species is very complicated. We have adopted the name *ascensionis** from Osbeck as referring without much doubt to this species, although the description is scanty. The probability of the correctness of this identification is heightened by the record of this species from the same island (Ascension) by Dr. Günther. If Osbeck's name be rejected as unidentifiable, the names *punctatus* Bonnaterre and *osbecki* Lacépède must go with it, while the names *punctatus* and *maculatus* of Bloch are preoccupied in this genus. Our choice lies, therefore, between *ascensionis* Osbeck and *atlanticus* Lacépède. We think that the certainty of identification is sufficient to warrant us in preferring the former name. Of the remaining synonyms, *nigriculus*, *impetiginosus*, *capreolus* and *varius* undoubtedly belong to the present species, and probably *pixanga* also. For the identification of Bloch's *maculatus* and Lacépède's *atlanticus* we have relied on the authority of Peters.

25. Epinephelus analogus.

Epinephelus analogus, Gill, Proc. Ac. Nat. Sci. Phila., 1863, 163 (Panama); Jordan & Gilbert, Proc. U. S. Nat. Mus., 1881, 232 (Acapulco); Jordan & Gilbert, *op. cit.*, 1882, 376 and 625 (Panama); Jordan & Gilbert, Bull. U. S. Fish Comm., 1882, 107, 110 (Mazatlan; Panama).

Serranusanalogus, Günther, Fishes Centr. Amer., 1869, 410 (Panama); Steindachner, Ichth. Beitr., iv, 1871, 5 (Acapulco; Mazatlan; Panama).

Serranus courtadré, Bocourt, An. Sci. Nat., Paris, 222, 1868 (La Unione; San Salvador); Vaillant & Bocourt, Mission Scientifique au Mexique, 1875, 80.

Habitat.—Pacific coast of tropical America.

Head, $2\frac{2}{5}$ (3); depth, 3 ($3\frac{2}{3}$). D. X, 17; A. III, 8. Scales, 18–100–x. Length (4944, Panama), $12\frac{1}{4}$ inches.

General form of *Epinephelus ascensionis*, the body oblong, rather robust. Head moderately acute, the anterior profile straight from tip of snout to above eye, thence moderately convex. Snout short, $4\frac{3}{4}$ in head. Mouth large, oblique, the maxillary reaching to beyond eye, its length $2\frac{1}{4}$ in head. Lower jaw strongly projecting, as in *E. ascensionis*. Ca-

* The following is Osbeck's description, as given in the English edition of his Voyage to China, London, 1771, Vol. II, p. 96: "*Tranchinus Adscensionis.* This fish tastes exceedingly well, and is distinguished from others by the following marks: The *dorsal-fin* has 28 rays, the *pectoral-fins* 18, the *ventral-fins* 5, the *anal-fin* 11, the tail 16, and the *membrana branchiostega* 6 rays; the latter is white, with brown spots; the single dorsal fin is everywhere of equal breadth, and runs from the head to the tail; its first 11 rays are sharp-pointed; the pectoral fins are obovated and so are the ventral-fins, and their first ray is prickly; the first 3 rays of the anal-fin, which is likewise obovated, are prickly; the tail is wedge-shaped, with short rays; the body is somewhat compressed and not quite round, covered with a white skin, on which the brown spots run into one another; the *head* is somewhat compressed; the *opercula branchiostega* consist of three scales, of which the middlemost ends in two teeth; one of them is long and pointed; the *eyes* are near each other, in the upper part of the head, and are large; the *nostrils* are round; besides them are two greater holes in the forehead; the *teeth* are fixed in the gums and throat in several rows; they are numerous, long, and very sharp; five of them are longer, namely, three in the upper jaw and two in the lower; the *jaws* are equal in length."

nine teeth short, those of lower jaw small. Eye rather large, $5\frac{3}{5}$ in head. Interorbital space gently convex, its width $7\frac{2}{3}$ in head. Nostrils round, subequal. Preopercle well serrate, its outline strongly convex, without distinct emargination. Gill-rakers moderate, about 15 below angle of arch.

Scales moderate, rather strongly ctenoid. Dorsal spines rather strong, the third and fourth subequal, $3\frac{1}{8}$ in head. Caudal fin slightly rounded, $1\frac{9}{10}$ in head. Anal high, its longest ray $2\frac{2}{5}$ in head. Second anal stronger than third, but rather shorter, 5 in head. Pectorals reaching beyond tips of ventrals, $1\frac{5}{6}$ in head.

Color, in spirits, brown, clouded with darker and with faint dusky cross-bars; body and fins everywhere covered with roundish dark-brown spots. These are larger and fewer below; smallest and most numerous on the fins, and everywhere very distinct. Soft dorsal with 3, spinous dorsal with about 2 rows of dark spots. In life they are probably orange-brown, on an olivaceous ground, as in *E. ascensionis*, to which species, as the name indicates, this fish is extremely analogous. No distinct dusky edgings to fins. No evident dark blotches along base of dorsal.

This species is generally common on the Pacific coast of Tropical America, where it represents *E. ascensionis* of the Atlantic. It differs from the latter species, as well as from all other known *Epinepheli*, in the possession of but 10 dorsal spines. This number is constant in all the many specimens examined.

IV.—Genus ALPHESTES.

ALPHESTES, Bloch & Schneider, Syst. Ichthyol. 1801, 236 (*afer*).
PROSPINUS, Poey MSS., Gill, Proc. Ac. Nat. Sci. Phila., 1862, 237 (*chloropterus=afer*).
PLECTROPOMA sp., Auct. (*nec typus*).

We adopt the name *Alphestes* for those species which differ from *Epinephelus* proper in the presence of a strong antrorse spine on the lower limb of the preopercle. In this respect the species approach the genera *Plectropoma* and *Hypoplectrus*, with which group they have usually been associated. The three species admitted by us are very similar in form and evidently closely related. All of the species of *Alphestes* are American. All the species are of small size, most of them smaller than any of the true *Epinepheli*.

ANALYSIS OF SPECIES OF ALPHESTES.

a. Second anal spine considerably longer than third, its length more than one-third head; head small; scales mostly cycloid.

b. Preopercle with two antrorse spines below the angle; silvery white, with rose-colored markings; maxillary extending to below middle of eye ....PICTUS, 26.

bb. Preopercle, with a single strong antrorse spine below its angle.

c. Olivaceous, the ground color nearly uniform, the body and fins closely covered with small dark-brown spots; breast plain; snout slender, pointed; lower jaw rather strongly projecting .....MULTIGUTTATUS, 27.

cc. Olive, clouded with dusky, the body with rather few dark orange spots; breast with pearly spots; a dark mustache above the maxillary; lower jaw little projecting.....AFER, 28.

26. Alphestes pictus.

Plectropoma pictum, Tschudi, Fauna Peruana, p. 5, 1844 (coast of Peru); Günther, i, 164, 1859 (copied).

Habitat.—Coast of Peru.

Known only from the description of Tschudi. In color, at least, it seems to differ from *A. multiguttatus*, which it approaches in other respects.

The following is the substance of Tschudi's original description:

D. XI, 17; A. III, 9. Depth, $2\frac{4}{5}$ in length. Head, 3. Eye half length of lower jaw. Cleft of mouth extending to below middle of eye. On angle of preopercle is a thin broad tooth directed forward; before it one longer and stronger. Teeth of ascending limb of preopercle sharper. upward and more distinctly separated. Fourth dorsal spine longest. Caudal convex. Anal rounded. Second anal spine longer than third. Ventrals extending slightly beyond tips of pectorals.

Ground color silvery white, with irregular markings of bright rose-color.

Rare on the coast of Middle Peru; more common in Chili. Often seen in the markets of Valparaiso.

27. Alphestes multiguttatus.

Plectropoma multiguttatum, Günther, Proc. Zool. Soc., London, 1866, 600 (Panama).

Alphestes multiguttatus, Jordan & Gilbert, Bull. U. S. Fish Comm., 1882, 107, 110 (Mazatlan; Panama); Jordan & Gilbert, Proc. U. S. Nat. Mus., 1882, 375.

Epinephelus multiguttatus, Jordan & Gilbert, Proc. U. S. Nat. Mus., 1882, 625 (Panama).

Plectropoma afrum, Günther, Fishes Centr. Amer., 1869., 411 (Panama).

Habitat.—Pacific coast of tropical America.

Head, $2\frac{2}{5}$ (3); depth, $2\frac{4}{5}$ ($3\frac{1}{3}$). D. XI, 16; A. III, 9. Scales, 13–80–x. Length (29519, Panama), $7\frac{1}{4}$ inches.

Body oblong ovate, compressed. Head small, slender, and pointed, the profile nearly straight from the snout to behind the eye, where is formed a considerable angle; the outline thence steeper, but still nearly straight to the front of the dorsal fin. Snout very short, rather pointed, $5\frac{1}{2}$ in head. Mouth small, oblique, the maxillary not reaching to posterior margin of eye, its length $2\frac{2}{5}$ in head. Teeth small; small canines present in upper jaw only. Lower jaw rather strongly projecting. Eye large, $4\frac{1}{2}$ in head. Interorbital space very narrow, convex, its width 10 in head. Preopercle strongly convex; the angle not salient, but armed with sharp radiating serræ.

Below the angle is a strong flattish spine directed downwards and forwards, as in *A. afer*. Nostrils small, round, close together, subequal. Gill-rakers moderate, about 14 on lower limb of arch.

Scales not very small, mostly cycloid; those on opercles somewhat enlarged.

Dorsal spines rather short and stiff, the fourth 3 in head. Soft dorsal high. Caudal subtruncate, 2 in head; anal rather high, rounded, the longest rays 2 in head. Second spine longer and stronger than third, $2\frac{4}{5}$ in head. Pectorals broad, reaching a little beyond tips of ventrals, $1\frac{2}{3}$ in head.

Color, in spirits, dark brown, the body and head profusely covered with round spots of a darker brown, their diameter about half that of the pupil. Spots on posterior part of body confluent in horizontal streaks; breast and front of head with few spots; a very faint mustache above maxillary. Dorsal and caudal dusky olive, nearly plain; anal with two cross-bands of dusky; pectoral yellowish, with 5 dusky cross-bands, its edge pale; ventrals dusky.

This little fish is rather common on the Pacific coast of Mexico and tropical America, where it represents *A. afer* of the Atlantic. In form, size, and general appearance the two resemble each other closely. The coloration is, however, quite different, and there are some small differences in form, the Pacific fish having a slenderer head, with more prominent lower jaw.

28. Alphestes afer. *Guaseta.*

Epinephelus afer, Bloch, Ichthyologia (about 1795), tab. 327 (Guinea?).

Alphestes afer, Bloch & Schneider, Syst. Ichthyol, 1801, 236 (copied); Peters, Berliner Monatsber., 1865, 105 (identification of Bloch's type with *chloropterum* and *monacanthus*); Jordan & Gilbert, Proc. U. S. Nat. Mus., 1882, 375.

Plectropoma chloropterum, Cuv. & Val. ,ii, 398, 1828 (San Domingo; Martinique); Poey, Memorias, i, 73, tab. 9, f. 3, 1851 (Cuba); Vaillant & Bocourt, Miss. Sci. au Mexique, 1875, 107, pl. v, f. 3; Poey, Repertorio, i, 265, 1867 (Hayti; Martinique; Brazil).

Prospinus chloropterus, Poey, Syn. Pisc. Cubens., 1868, 289; Poey, Enum. Pisc. Cubens., 1875, 18.

Plectropoma monacanthus, Müller & Troschel, Schomburgk's Hist. Barbadoes, 665, 1848 (Barbadoes); Günther, i, 1859, 164 (copied).

Alphestes monacanthus, Cope, Trans. Am. Philos. Soc., 1871, 467 (St. Martin's).

Habitat.—West Indies.

Head, $2\frac{4}{7}$ ($3\frac{1}{5}$); depth, $2\frac{2}{3}$ ($3\frac{1}{3}$). D. XI, 17; A. III, 9. Scales, 14–80–x. Length, $7\frac{1}{2}$ inches.

Body oblong, ovate, rather compressed, the greatest width $2\frac{1}{4}$ times in the depth. Head small, rather pointed, the profile nearly straight from the tip of the snout to the nape, there forming a considerable angle, being steeper and more gibbous to the front of the dorsal fin. Snout short, shorter than eye; mouth small, the maxillary extending a little beyond the eye, its length $2\frac{2}{5}$ in head. Teeth comparatively small, in broad bands, the upper jaw with about four small canines, the canines of the lower jaw scarcely differentiated. Lower jaw rather weak, little projecting. Eye large, $4\frac{1}{2}$ in head. Interorbital space, moderate, convex, its width 6 in head. Preopercle strongly and unequally convex, its upper limb oblique, without notch above the angle.

Upper limb of preopercle with slender teeth which regularly increase in size downward, those at the rounded angle strong; below the angle is a strong flattish spine, directed forwards and downwards, its length 4 in eye. Nostrils small, round, close together.

Scales not very small, mostly cycloid, those on opercles larger than those on body, those on cheeks small.

Gill-rakers short and stout, their length not more than half pupil, about 12 below angle.

Dorsal spines rather short, robust and pungent, the second higher than the tenth, the fourth and fifth highest, $2\frac{1}{3}$ in head, the outline of the fin gently curved; soft rays about as high as third spine; caudal convex behind, its angles rounded, its length $1\frac{3}{5}$ in head. Anal rather high, posteriorly rounded, its longest soft rays 2 in head. Second anal spine longer and stronger than third, $2\frac{2}{3}$ in head. Pectorals broad, rounded, extending beyond tips of ventral, $1\frac{3}{5}$ in head.

Color in life, dark brownish olive, mottled with darker blotches. Body with some dark orange spots. Vertical fins dark olive, mottled with darker blotches. Yellow under head. Pectorals dull olive red, with bluish spots. Ventrals dull olive, edged with darker. Some pearly spots on breast and on anal. Moustache, dark-red brown.

The orange spots become brown in spirits.

This species is not uncommon on the coast of Cuba, numerous specimens having been obtained by Professor Jordan at Havana. It reaches a length of less than a foot, and is known to fishermen as *Guaseta*.

For the identification of the *afer* of Bloch with *monacanthus* and *chloropterus* we are indebted to Peters. The genus *Alphestes* (*Prospinus*) seems to be fairly well founded. We cannot regard it, however, as having any special affinity with most of those called by Cuvier "*Plectropoma*."

V.—Genus ENNEACENTRUS.

BODIANUS, Gill, Proc. Ac. Nat. Sci. Phila., 1862, 237 (not of Bloch, whose type is properly *Bodianus bodianus*, Bloch=*Labrus rufus*, L.).
ENNEACENTRUS, Gill, Proc. Ac. Nat. Sci. Phila., 1865, 105 (*ouatalibi=punctatus*).
PETROMETOPON, Gill, Proc. Ac. Nat. Sci. Phila., 1865, 105 (*guttatus=cruentatus*).
MENEPHORUS, Poey, Ann. Lyc. Nat. Hist. N. Y., about 1867 (*dubius*).

This genus was first indicated by Dr. Gill, under the name *Bodianus*, adopted from Bloch. The original *Bodianus*, Bloch was a heterogeneous assemblage of Labroid and Percoid fishes. The name *Bodianus* came from the Portuguese vernacular name (*Bodiano*) one of its species called by Bloch *Bodianus bodianus* (=*Harpe rufa*, Auct.). As the name *Bodianus* "was originally proposed more especially for the *Bodianus bodianus*, it must either be retained for that type or consigned to that oblivion to which the utterly worthless nature of its original constitution so richly entitles it."—(Gill.) Later, this group was divided by Dr. Gill into two *Enneacentrus* and *Petrometopon*. This division seems to us imprac-

ticable for the present, as the crania of but two of the numerous species (*guttatus, fulvus*) have as yet been examined. We unite all nine-spined *Epinepheli* in a single generic group, *Enneacentrus*.

ANALYSIS OF SPECIES OF ENNEACENTRUS.

a. Caudal fin rounded or subtruncate.

b. Sides with nine or ten dark cross-bands; sides of head and jaws with many round bluish or yellowish spots; a large jet-black spot behind eye; vertical fins edged with blue; lower jaw much projecting; preopercle very finely serrulate, its angle not salient; scales rather large (lat. l. about 80); second anal spine longest; caudal much rounded.....PANAMENSIS, 29

bb. Sides without cross-bands.

c. Skull convex between orbits (*Petrometopon*, Gill); body, head and fins more or less covered with scarlet or orange spots; about four round inky spots along base of dorsal; lower jaw not strongly projecting; caudal fin much rounded; scales rather large (lat. l. about 80).....GUTTATUS, 30.

cc. Skull channeled between orbits (*Enneacentrus*); head and body with few or many small blue dark-edged spots; lower jaw strongly projecting.

d. Snout with one or two blue stripes; back of tail without conspicuous black blotch; caudal rounded; scales small (lat. l. about 115).....TÆNIOPS, 31.

dd. Snout without stripes; back of tail with two black spots; lower jaw with a black spot at tip; caudal subtruncate; scales moderate (lat. l. about 90). FULVUS, 32.

aa. Caudal fin lunate (*Menephorus*, Poey); carmine red, the head and body sprinkled with blue dark-edged spots; preopercle without salient angle..DUBIUS, 33.

29. Enneacentrus panamensis.

Serranus Panamesis, Steindachner, Ichth. Beitr., iv, 1871, 1 (Panama).

Habitat.—Panama.

This species is known only from Steindachner's description and excellent figure.

30. Epinephelus guttatus. *Enjambre; Coney; Rough Hind.*

a. Scarlet variety (*guttatus*).

Cugupuguacu, Willoughby, Appendix, pl. 6, f. 1 (Brazil; not of text, p. 303; not of Marcgrave, fide Poey).

Perca guttata, Linnæus, Syst. Nat., x, 1758, 292 (in part, after Marcgrave, Sloan, Willoughby, Ray, and Catesby); Linnæus, Syst. Nat., xii, 485, 1766; Gmelin, 1788, 1355 (copied; perhaps the brown variety).

Perca guttata, Bloch, Ichthyol., pl. 312, about 1795 (description and figure from a drawing by Plumier).

Serranus guttatus, Castlenau, "Anim. nouv. ou rares, S. Amer., about 1850, i" (Brazil).

Sparus cruentatus, Lacépède, Hist. Nat. Poiss., iv, 157, tab. 4, f. 1, 1803 (on a copy of Plumier's drawing).

Serranus apiarius, Poey, Memorias Cuba, ii, 143, 1860 (Havana).

Petrometopon apiarius, Poey, Synopsis Pisc. Cubens., 1868, 288; Poey, Enum. Pisc. Cubens., 1875, 20 (name only).

Serranus coronatus, (pale variety) Günther, i, 124, 1859 (Puerto Cabello; Cuba, Jamaica, and Trinidad); Cope, Trans. Am. Philos. Soc., 1871, 466 (St. Croix; New Providence).

b. Brown variety (*coronatus*).

Serranus coronatus, Cuv. & Val., ii, 371, 1828 (Martinique); Poey, Repertorio, i, 198, 1868.

Serranus coronatus var. *nigriculus*, Günther, i, 1859, 124.

Petrometopon guttatus, Poey, Synopsis Pisc. Cub., 1868, 288 (Havana); Poey, Enum. Pisc. Cubens., 1875, 19.

Epinephelus guttatus, Jordan, Proc. U. S. Nat. Mus., 1884, 125 (Key West).

Habitat.—West Indies to Brazil, var. *coronatus* extending northward to Florida Keys.

Head, $2\frac{1}{2}$ ($3\frac{1}{6}$); depth, $2\frac{5}{6}$ ($3\frac{1}{3}$). D. IX, 14; A. III, 8. Scales, 14–80–x. Length, $8\frac{1}{2}$ inches.

Body oblong, rather deep and compressed, its width $2\frac{1}{4}$ in greatest depth. Head moderate, a little acute anteriorly, the profile nearly straight from snout to nape, where it is rather convex. Mouth rather large, the maxillary extending somewhat beyond eye, its length $1\frac{7}{8}$ in head. Lower jaw not strongly projecting. Teeth in narrow bands, the depressible teeth of the inner series very long and slender, longer than in any other of our species, those of the lower jaw and front of upper especially enlarged, longer than the small, subequal canines. Eye large, 5 in head; interorbital space narrow, with a median depression, its width 7 in head. Preopercle convex, very weakly serrate, its posterior angle obliquely subtruncate, without salient angle or distinct emargination. Opercle with three distinct spines. Nostrils small, subequal. Gill-rakers slender.

Scales rather large, mostly ctenoid.

Dorsal spines rather slender and pungent, the fourth and fifth spines highest, $3\frac{2}{5}$ in head, the outline of the fin gently arched. Caudal very convex, its middle rays $1\frac{3}{5}$ in head, their length $1\frac{2}{5}$ times that of the outer rays. Anal rounded, its longest ray half head. Second anal spine a little stronger than third and slightly longer, $2\frac{2}{3}$ in head. Pectorals long, reaching much past tip of ventrals, $1\frac{1}{2}$ in head.

Coloration of brown variety, CORONATUS.—In life, whitish or dusky olive, somewhat translucent, the head decidedly greenish. Spots everywhere, all bright orange-red, darker in the center, those on the edges of the vertical fins darker maroon, or cherry color. Four larger spots along base of dorsal, inky black, irregular, the third largest, the fourth smallest. A very small one on each side of shoulder. Eyes green above, with red specks, iris yellow. Fins rather bluish. Tips of ventrals dusky. Tips of vertical fins appearing so, from the darker color of the spots. In spirits the bright spots become brown or fade into the ground color; those on the head mostly disappearing.

Scarlet variety, GUTTATUS.—The coloration in life differs from the above in having the ground hue a livid reddish gray, a little paler below, and the spots are vermilion, usually darker posteriorly. The spots are larger than in the preceding, especially anteriorly.

In spirits the vermilion spots become light gray, except posteriorly,

where they are brown. Those on the head remain very distinct, those above never disappearing.

Professor Poey regards the two forms above noted as distinct species, calling the red one *apiarius*, the brown one *guttatus*. So far as we can see, the two are absolutely identical in every respect except color. We cannot, therefore, regard them as distinct species, but think them color varieties, dependent on the depth of the water or the character of the bottom. The differences are certainly less than those separating var. *punctatus* from *E. fulvus*.

Both forms are extremely common in the markets of Havana, where they are known without distinction as *Enjambre*. At Key West only the brown form was seen, and this is there paler and more olivaceous than at Havana. It is there not very common, and is known as Coney or Rough Hind. This is one of the smallest species of *Epinephelus*, rarely exceeding a foot in length.

The nomenclature of this species is still unsettled. If we do not adopt for it the Linnæan name *guttatus*, the oldest remaining name is clearly that of *cruentatus*, Lacépède.

It is also somewhat uncertain as to which of the two varieties is intended in some of the earlier descriptions. Our views of each of these are expressed in the above synonymy.

NOTE ON PERCA GUTTATA, LINNÆUS.—In the tenth and twelfth editions of the Systema Naturæ, as well as in Gmelin's edition, appears the following account of the *Perca guttata*:

GUTTATA. 14, P. pinnis dorsalibus unitis, cauda integra, corpore punctis sanguineis adsperso.

Maregr. bras. 169, Cugupuguacu.
Sloan. jam. 2, *p.* 280, *t.* 247, *f.* 2.
Will. icht. 303, *t.* 1.
Raj. pisc., 127.
Catesb. car. 2, *p.* 14, *t.* 14.

Habitat.—America.

The earliest of these references in point of time is that of Marcgrave, and, if we are not mistaken, each of the later writers conceived that his specimen was identical with Marcgrave's fish.

We are indebted to Professor Poey for an outline of Marcgrave's account. The species is not figured. From the text it appears that the *Cugupuguacu* is a gigantic fish ("piscis ingens"), its body, with the tail, being 6 feet in length. It has a single dorsal fin, spinous in front; its caudal is quadrate; its scales are small. The head, back, and sides are gray in color, this hue mixed with darker shades. Fins, including the caudal, dilute brown; whole head, back, sides, and pectoral fins with small black scattered spots. Belly and the rest of the fins, with the tail, without spots.

This fish is manifestly neither *Epinephelus apua* nor *Enneacentrus cruentatus*. It is most probably *E. itaiara*.

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The figure in Sloane's Jamaica we have not seen. From Mr. Goodes' remarks we infer that it might be identified with *E. apua*.

Willoughby has (according to Poey *in lit.*) copied the description of Maregrave, adding to it in the appendix a figure of a fish seven to eight inches long which he conceives to be Maregrave's species. This figure, according to Poey, probably represents *Epinephelus cruentatus*. It is certainly not the original *Cugupuguacu* intended. Ray's work is not accessible to us, but his description is probably a copy of that given by Willoughby.

Catesby's figure of "the Hind" was supposed by its author to represent the *Cugupuguacu* of Maregrave, with which he erroneously identifies the Bermuda Hind. Goode observes (Bull. U. S. Nat. Mus., 1876, v, 59), "the figure of Catesby agrees precisely with the Bermuda Hind [*E. apua* of this paper] except in the small matter of the number of the dorsal spines, a matter of detail not likely to have been noticed by Catesby, judging from his other figures." Of the correctness of this identification of Catesby's figure there can be no doubt. Finally, we may observe that a skin of *E. apua* is now (according to Dr. Bean) in the possession of the Linnæan Society of London; a specimen belonging to Linnæus's own collection, and labeled by him *Perca guttata*. This specimen is, however, not referred to in the Systema Naturæ, and cannot therefore be properly taken in evidence as the original type of the species.

Five courses are therefore possible as to the Linnæan name *guttatus* in the genus *Epinephelus*.

1. To consider *Cugupuguacu* of Maregrave the type, and to regard Maregrave's fish as unidentifiable, thus suppressing the name *guttatus*.

2. To regard *Cugupuguacu* of Maregrave the type, and to identify this with Lichstentein's *itaiara*, thus using the name *guttatus* instead of *itaiara*.

3. To consider that the use of the name *Perca guttata* by Bloch for a single species, restricted in some sense the complex Linnæan name to Willoughby's figure, which is supposed to represent the species figured by Bloch. This view would substitute *guttatus* for *cruentatus*, and is the view adopted by Poey.

4. To regard the Linnæan specimen as fixing the type of *Perca guttata* to the species figured by Catesby, with which this specimen is thought to be identical. This would substitute *guttatus* for *apua*.

5. To consider the Linnæan *guttata* a mélange of unrelated and partially unidentified species which should be altogether ignored.

It is certain, as Poey has observed (*in lit.*), that although Linnæus probably intended the name "*guttata*" for Maregrave's fish, he did not fix his attention on the original "ingens piscis" of Maregrave,

but relied for his diagnosis on some of the later authors, most likely on the figures of Willoughby or Catesby. The fish he had in view in forming his diagnosis was probably either *E. apua* or *cruentatus*. For *E. cruentatus* Bloch soon after retained the name *guttatus*, and in this he has been followed by Poey. This arrangement probably best accords with the custom of naturalists generally.

As a matter of fact, justice, and perhaps convenience also, would be best served by adopting the fifth of the above alternatives. Linnæus had Marcgrave's fish in mind as his type, but derived his knowledge of it from other authors who had never seen it, and whose accounts refer to other fishes, and to more than one other species.

31. Enneacentrus tæniops.

?Perca punctata, Bonnaterre, Tabl. Encycl. Meth., 1788, 130 (Senegal; not of Linnæus).

Serranus tæniops, Cuv. & Val., ii, 370, 1828 (Cape Verde); Günther, i, 121, 1859 (St. Vincent); Steindachner, Fische Afrikas, 1881, 4, taf. 1 ("very common on the coast of Senegambia to the Cape Verde Islands and Guinea; rare on the coasts of the Bahama Islands to Florida").

Bodianus tæniops, Jordan & Gilbert, Syn. Fish. N. A., 1883, 919 (copied).

Habitat.—West Indies; Florida; Cape Verde Islands; west coast of tropical Africa.

This species has not been studied by us. Steindachner mentions specimens with the ground color red and others dark golden brown or blackish brown. The color varieties probably resemble those of *E. fulvus* and *E. guttatus*.

32. Epinephelus fulvus. *Guativere; Nigger-fish; Yellow-fish; Couey; Butter-fish.*

a. Yellow variety (*fulvus*).

Turdus cauda convexa (the Yellow-fish), Catesby, Nat. Hist. Carolina, 1743, pl. x, f. 2.

Labrus fulvus, Linnæus, Syst. Nat., ed. x, 1758, 287 (after Catesby); Linnæus, Syst. Nat., ed. xii, 1766, 479.

Guativere (*amarilla*), Parra, Descr. Dif. Piezas, Hist. Nat. Cuba, 1787, 7, lam. v, f. 2 (Cuba).

Holocentrus auratus, Bloch, Ichthyol., vii, 57, 1792, taf. 236 ("East Indies"); Bloch & Schneider, Syst. Ichthyol., 1801, 314.

Serranus auratus, Cuvier & Valenciennes, ii, 364, 1828 (copied); Peters, Berlin. Monatsber., 1865, 103 (identification of *Holocentrus auratus*, Bloch).

Bodianus guativere, Bloch & Schneider, Syst. Ichth., 1801, 336 (based on both Parra's figures).

Serranus guativere, Cuv. & Val., ii, 383, 1828 (on Parra's second figure); Müller & Troschel, "Schomb. Hist. Barbad., 1848, 665"; Cope, Trans. Am. Philos. Soc., 1871, 466 (New Providence); Poey, Repertorio, i, 203.

Habitat.—West Indies; Bermudas; Florida Keys.

b. Scarlet variety (*ouatalibi*).

Carauna, Marcgrave, Hist. Brasil, 1648, 147 (Brazil).

Guativere, Parra, Descr. Dif. Piezas, Hist. Nat., 1787, lam. v, f. 1 (Cuba).

Perca punctata, Bloch, Ichthyol., about 1795, 314 (on a figure by Plumier).

Gymnocephalus ruber, Bloch & Schneider, Syst. Ichthyol., 1801, 346, taf. 67 (on *Carauna* of Marcgrave; not *Epinephelus ruber*, Bloch).

Serranus ouatalibi, Cuv. & Val., ii, 381, 1828 (Havana); Guichenot, Ramon de la Sagra, Cuba, Poiss., 1845, 15 (Havana); Müller & Troschel, Schomburgh's Exped. Barbad., 1848, 665 (Barbadoes); Günther, i, 1859, 120 (Jamaica; Cape Verde); Cope, Trans. Am. Phil. Soc., 1870, 466 (St. Croix; New Providence; St. Kitt's); Poey, Repertorio, i, 202, 1867.

Serranus carauna, Cuv. & Val., ii, 384, 1828 (Brazil); Castelnau, Anim. nouv. Amér. Sud, 1, pl. i, f. 1 (Brazil).

c. Brown variety (*punctatus*).

Perca marina puncticulata (the NEGRO-FISH), Catesby, Nat. Hist. Carolina, &c., 1743, pl. 7 (Bahamas).

Perca punctata, Linnæus, Syst. Nat., x, 1758, 291 (based on Catesby); Linnæus, Syst. Nat., xii, 1766, 485.

Enneacentrus punctatus, Poey, Syn. Pisc. Cubens., 1868, 288 (Cuba); Goode, Bull. U. S. Nat. Mus., v, 1876, 59 (Bermudas).

Epinephelus punctatus, Jordan & Gilbert, Syn. Fish. N. A., 1883, 541.

Bodianus punctatus, Jordan & Gilbert, Syn. Fish. N. A., 919 (name only).

Perca punctulata, Gmelin, Syst. Nat., 1788, 1315 (after Catesby).

Enneacentrus punctulatus, Poey, Enum. Pisc. Cubens., 20, 1875 (Havana).

Head, $2\frac{2}{3}$ ($3\frac{1}{4}$); depth, 3 ($3\frac{2}{3}$). D. IX, 15; A. III, 9. Scales, 15–90–x. Length, 8 inches.

Body oblong, moderately compressed, its greatest width $2\frac{1}{5}$ in depth. Head rather pointed anteriorly, the profile forming an even curve from snout to base of dorsal. Mouth moderate, the maxillary extending somewhat beyond eye, its length 2 in head. Lower jaw strongly projecting. Teeth in narrow bands, rather large, the depressible teeth smaller than in *E. cruentatus;* canines rather small, subequal. Eye large, 5 in head; interorbital space narrow, flattish, with a median depression, its width 7 in head. Preopercle with weak serrations, its outline convex, with a slight and shallow emargination, its angle not salient. Opercle with 3 distinct spines. Nostrils small, subequal. Gill-rakers slender.

Scales rather large, mostly ctenoid. Dorsal spines slender, pungent, the fourth and fifth highest, the outline of the fin above nearly straight. Caudal truncate, its angles slightly rounded, its longest rays $1\frac{5}{7}$ in head, scarcely longer than the outer rays. Anal high, rounded, its longest rays 2 in head. Second anal spine stronger and rather longer than third, $2\frac{2}{3}$ in head. Pectoral long, reaching much past tips of ventrals, $1\frac{1}{2}$ in head.

COLORATION.

(*a*) Brown variety (*punctatus*).—Color in life blackish olive. Spots everywhere on sides and head, dark blue with light blue centers. Dorsal fin dusky olive, edged with darker, a few spots on its base; the soft dorsal margined with whitish. Caudal dusky olive. Anal and ventrals violaceous black. Pectorals olivaceous. The spots in spirits become brown, with gray centers.

(*b*) Red variety (*ouatilibi*).—Color in life vivid scarlet. Spots on head nearly black; others light blue, with a purplish border. Two black spots

on lower jaw and two on back of tail. Caudal paler than body, with a few scattering dark points. Ventrals and anal edged with dusky. Pectorals paler than dorsal. In spirits this fish becomes pale, almost cream-color. Spots on head dark, the others brown, with grayish margins.

(*c*) Yellow variety (*fulvus*).—Color in life lemon yellow, being somewhat orange red on the back. Two black spots on back of tail; a few sky-blue spots on body anteriorly and on head, with darker margins; a few violet spots about eye. Fins colored like body. Head, pectorals, and dorsal a little redder than rest of fish. Edge of spinous dorsal blackish. Color in spirits olivaceous yellow.

This species is very abundant throughout the West Indies, and apparently reaches a smaller size than any other of our *Epinepheli*. It is brought in great numbers to the markets of Havana, where it is known as *Guativere*, the yellow variety being distinguished as *Guativere Amarilla*. No specimens have yet been obtained in Florida, but Key West fishermen say that the "Nigger-fish" is not uncommon there. We have seen none over a foot in length.

The color variations in this species are greater and more constant than in any of the other species, and have early attracted attention. We find no difference whatever among the different forms except in the coloration, and we believe that at present no naturalist regards them as different species.

In the Havana market the typical or red variety is most abundant; next comes the brown form, which much resembles the red, while the yellow variety, which is peculiar in its markings as well as in its ground color, is rather rare. These differences are probably due to the character of the bottoms, and perhaps in some degree to differences in depth of water.

The name of this species has been somewhat unsettled for different reasons. There is, however, apparently no room for question as to the name to be adopted, the name *Labrus fulvus* of Linnæus having clear priority and belonging without any doubt to the yellow variety of this fish.

Some confusion has arisen from the fact that Linnæus has, in his twelfth edition, by some inadvertence, left two species with the same name, *Perca punctata*, his "*Perca punctatus*" being No. 4, on page 482, and "*Perca punctata*" No. 20, on page 485. In the tenth edition, however, the former is not found, and it is from this, the earliest binomial name given to any American *Epinephelus*, that the name *punctatus* must be dated. The "*Perca punctatus*" No. 4 was probably originally intended to be placed in some other genus, as *Labrus* or *Sparus*, and then removed in the proof-reading to *Perca*. This seems the more probable as the number 4 is duplicated, *Perca zingel* standing without number, between *P. punctatus* and No. 3. This *Perca punctatus* is *Sciæna chrysura*, (Lac.) (=*argyroleuca*, Mitch.).

The remaining synonomy of *Epinephelus punctatus* requires no special remark. The name *punctulatus* of Gmelin has been used by Poey, through ignorance of the fact that the earliest use of the name *punctatus* is for the present species and not for the *Sciæna*.

33. Epinephelus dubius.

Serranus dubius, Poey, Memorias, ii, 142, 1860 (Cuba).
Enneacentrus dubius, Poey, Synopsis Pisc. Cubens., 289, 1868.
Menephorus dubius, Poey, Ann. Lyc. Nat. Hist. N. Y., x, 50, 1869; Poey, Enumeratio Pisc. Cubens., 1875, 21.
? *Menephorus punctiferus*, Poey, Enumeratio Pisc. Cubens., 21, 1875 (Cuba).

Habitat.—Coasts of Cuba.

We have not seen this species, and it appears to be very rare in the markets of Havana, the only locality where it has yet been noticed. Comparison of the descriptions published by Poey leads us to the belief that his *dubius* and *punctiferus* are not distinct species. The genus *Menephorus*, based on the lunate form of the caudal fin, does not appear to us to be needed. If retained, a similar genus should be established for the reception of *Epinephelus morio*.

VI.—Genus DERMATOLEPIS.

DERMATOLEPIS, Gill, Proc. Ac. Nat. Sci. Phila., 1861, 54 (*punctatus*).
LIOPERCA, Gill, Proc. Ac. Nat. Sci. Phila., 1862, 237 (*inermis*).

This genus is accepted by us for two species, which, while evidently closely related to *Epinephelus*, show divergences in the direction of *Rhypticus*. These are shown in the form, the smooth scales, the small teeth, and numerous soft rays in the dorsal, as well as in other respects. The two known species are extremely similar, the generic characters supposed to distinguish *Dermatolepis* from *Lioperca* being due to differences of age and condition of specimens.

ANALYSIS OF SPECIES OF DERMATOLEPIS.

a. Preopercle weakly, but evidently serrate; upper jaw with very small canines; pectoral fins long, more than two-thirds length of head, reaching vent; anal spines rather strong; dusky olive, with large rounded whitish spots; no black spots on head; a whitish streak from snout through eye toward front of dorsal ..... INERMIS, 34.

aa. Preopercle subentire; canine teeth obsolete; pectoral fins short, not two-thirds length of head and not reaching vent; anal spines short; dusky olive, with round whitish spots; head with smaller black spots ..... PUNCTATUS, 35.

34. Dermatolepis inermis.

Serranus inermis, Cuv. & Val., Hist. Nat. Poiss., ix, 436, 1883 (Antilles); Poey, Memorias Cuba, i, 1851, 54, lam. 4, f. 2 (Cuba); Günther, i, 1859, 153 (Cuba); Poey, Repertorio, i, 198, 1867.
Lioperca inermis, Poey, Syn. Pisc. Cubens., 282, 1868 (Havana); Poey, Enum. Pisc. Cubens., 17, 1875.

Habitat.—West Indies.

Head, $2\frac{3}{5}$ ($3\frac{1}{3}$); depth, $2\frac{1}{2}$ ($3\frac{1}{6}$). D. XI, 19; A. III, 9. Scales 24–125–x. Length, 12 inches.

Body comparatively short and deep, strongly compressed, the back elevated, the anterior profile concave, forming a re-entrant angle before the eye, thence nearly straight to the nape. Head compressed, the snout short, moderately pointed, $3\frac{2}{3}$ in head. Eye small, $5\frac{3}{4}$ in head. Interorbital space narrow, anteriorly with a broad groove which receives the spines of the premaxillary bones; its width 8 in head. Posterior part of head narrow, strongly convex transversely. Mouth small, oblique, the jaws subequal, the broad maxillary extending to below the middle of the eye, its length $2\frac{1}{2}$ in head. Supplemental maxillary well developed. Teeth in narrow bands, formed as in other *Ephinepheli*, but small. Canines scarcely differentiated; none in lower jaw; one on each side in upper jaw slightly larger than the other teeth. Preopercle with very weak and irregular serrations, the angle not salient, its teeth little, if any, enlarged. A very slight emargination above the angle. Opercle with a single spine, above which is a flat lobe. Opercular flap unusually large, extending beyond the spine for a distance nearly equal to the diameter of the eye. Gill-rakers rather slender, about 14 on lower part of anterior arch. Nostrils round, very close together, the posterior the larger.

Scales small, cycloid, somewhat imbedded in the skin; lower jaw scaly; maxillary, preorbital, and tip of snout naked.

Dorsal spines strong, the third highest, $2\frac{1}{2}$ in head, the others gradually shorter to the ninth, which is $3\frac{1}{2}$ in head. Soft dorsal elevated, the twelfth ray highest, 2 in head. Caudal long, rounded in outline, $1\frac{1}{3}$ in head. Anal very high, the middle soft rays $1\frac{3}{5}$ in head, the other rays rapidly shortened each way. Anal spines short and strong, graduated, the second spine $3\frac{3}{4}$ in head.

Pectorals very long, nearly reaching anal, $1\frac{1}{5}$ in head. Ventrals moderate, $1\frac{5}{7}$ in head.

Color in alcohol dusky brown, mottled with darker. Head, body, and fins covered with roundish whitish blotches, which are very irregular in form and size, some of them larger than the eye. The spots most numerous and distinct on the tail and on the lower part of the head. Several spots behind the eye, confluent into a pale stripe from eye toward spinous dorsal. Fins all blackish, the pale spots smaller and generally less distinct than on body. Pectorals olivaceous, with small, rather distinct black spots.

A single specimen of this rare species was obtained for Professor Jordan in Havana by Leonel Plasencia.

This species is the type of the genus *Lioperca*, Gill. It differs, however, in no important respect from the type of the prior-named *Dermatolepis*. Bleeker has referred *Lioperca* to his genus *Serranichthys* (or *Cromileptes*). It is not, however, certain that *Serranichthys altivelis* really belongs to this type. It has a singularly slender head and 12 dorsal spines.

35. Dermatolepis punctatus.

Dermatolepis punctatus, Gill, Proc. Ac. Nat. Sci. Phila., 1861, 54 (Cape San Lucas); Gill, *op. cit.*, 1862, 250; Jordan & Gilbert, Proc. U. S. Nat. Mus., 229, 1881 (Socorro Island).

Habitat.—Lower California; Revillagigedo Islands.

Head, $2\frac{9}{10}$ ($3\frac{1}{2}$); depth, $2\frac{2}{5}$ (3). D. XI, 19; A. III, 9. Scales, 24–115–x. Length (28223, Revillagigedo Islands), 14 inches.

Body comparatively short and deep, strongly compressed, the back elevated, the anterior profile forming a slight re-entrant angle before the eye, thence nearly straight to the nape. Head compressed, the snout short, moderately pointed, 4 in head. Eye small, $6\frac{1}{3}$ in head. Interorbital space quite narrow, anteriorly with a broad groove, which receives the spines of the premaxillaries, its width $7\frac{1}{2}$ in head. Cranium posteriorly narrow, strongly convex transversely. Mouth rather small, oblique, the jaws subequal, the broad maxillary extending to below the middle of the eye, its length $2\frac{1}{6}$ in head. Supplemental maxillary well developed.

Teeth small, formed as in other *Epinephelí*, but with no canines in either jaw, not even rudimentary ones. Preopercle not serrated anywhere, its upper part with a few irregular crenations, its angle not salient, its emargination obsolete.

Opercle with a rudimentary spine, above which is a flat lobe. Opercular flap extending beyond the spine for a distance nearly equal to the diameter of the eye.

Gill-rakers shortish, about 13 on lower part of anterior arch. Nostrils small, round, close together, the posterior one the larger.

Scales small, cycloid, somewhat imbedded in the skin. Maxillary, preorbital, and tip of snout naked.

Dorsal spines low, strong, subequal, the longest 4 in head; soft dorsal elevated, the longest ray $2\frac{9}{10}$ in head. Caudal long, subtruncate, with rounded angles, $1\frac{3}{4}$ in head. Anal very high, rounded, its middle rays $2\frac{1}{4}$ in head. Anal spines short and strong, graduated, the second spine 5 in head. Pectorals short, not nearly reaching vent, $1\frac{2}{3}$ in head. Ventrals short, $2\frac{1}{5}$ in head.

Color in spirits dusky brown, mottled with darker. Head, body, and fins covered with rounded, whitish blotches, very irregular in form and size, none of them so large as the eye, these spots most distinct on the body. Head, breast, and branchiostegals thickly covered with smaller, round, dark spots, very distinct on the jaws and on the membrane of the maxillary. Top of head with some dark longitudinal streaks. Pectoral with small black spots. Other fins blackish, with pale spots like those on the body, but smaller.

This species is known only from three specimens, two of them now unfortunately destroyed, the third, from Socorro Island, now in the United States National Museum. From the latter the foregoing description was taken. The very close resemblance existing between *D. punc-*

tatus and *D. inermis* will be evident on comparison of the two descriptions.

LIST OF NOMINAL SPECIES, WITH IDENTIFICATIONS.

The following is a list of the nominal species referred to in the foregoing paper, arranged in chronological order, with our identification of each. Specific names which are valid are in *italics*:

Nominal species.	Year.	Identification.
Labrus *fulvus*, L	1758	Enneacentrus *fulvus*.
Perca punctata, L	1758	Enn. *fulvus* punctatus.
Perca *guttata*, L	1758	Enn. guttatus.
Perca *venenosa*, L	1758	Mycteroperca venenosa.
Perca *gigas*, Brünnich	1768	Epinephelus gigas.
Trachinus *ascensionis*, Osbeck	1771	Ep. ascensionis.
Perca punctulata, Gmelin	1788	Enn. fulvus punctatus.
Trachinus punctatus, Bonnaterre	1788	Ep. ascensiouis.
Bodianus *apua*, Bloch	1790	Ep. apua.
Holocentrus *auratus*, Bloch	1792	Enn. fulvus.
Holocentrus punctatus, Bloch	1792	Ep. ascensionis.
Perca guttata, Bloch	1795	Enn. guttatus.
Perca maculata, Bloch	1795	Ep. ascensionis.
Perca punctata, Bloch	1795	Enn. fulvus ouatalibi.
Anthias *striatus*, Bloch	1795	Ep. striatus.
Epinephelus *afer*, Bloch	1795	Alphestes afer.
Johnius guttatus, Bloch & Schneider	1801	Myct. venenosa guttata.
Anthias cherna, Bloch & Schneider	1801	Ep. striatus.
Lutjanus lunulatus, Bloch & Schneider	1801	Ep. apua.
Bodianus marginatus, Bloch & Schneider	1801	Ep. apua.
Bodianus guativere, Bloch & Schneider	1801	Enn. fulvus
Gymnocephalus ruber, Bloch & Schneider	1801	Enn. fulvus ouatalibi.
Trachinus osbeck, Lacepède	1802	Ep. ascensionis.
Sparus cruentatus, Lac	1803	Enn guttatus.
Sparus atlanticus, Lac	1803	Ep. ascensionis.
Sparus chrysomelanurus, Lac	1803	Ep. striatus.
Holocentrus merou, Lac	1803	Ep. gigas.
Sparus *scirenga*, Rafinesque	1810	Myct. scirenga.
Serranus *itaiara*, Lichtenstein	1820	Promicrops itaiara.
Serranus *morio*, Cuv. & Val	1828	Ep. morio.
Serranus acutirostris, Cuv. & Val	1828	Myct. scirenga.
Serranus menzeli, Cuv. & Val	1828	Ep. gigas.
Serranus undulosus, Cuv. & Val	1828	Myct. scirenga.
Serranus *tæniops*, Cuv. & Val	1828	Enn. tæniops.
Serranus coronatus, Cuv. & Val	1828	Enn guttatus coronatus.
Serranus catus, Cuv. & Val	1828	Ep. apua.
Serranus nigriculus, Cuv. & Val	1828	Ep. ascensionis.
Serranus araiá, Cuv. & Val	1828	Ep. apua.
Serranus *cardinalis*, Cuv & Val	1828	Myct. venenosa guttata.
Serranus *niveatus*, Cuv. & Val	1828	Ep. niveatus.
Serranus ouatilibi, Cuv. & Val	1828	Enn. fulvus ouatalibi.
Serranus pixanga, Cuv. & Val	1828	Ep. ascensionis.
Serranus carauna, Cuv. & Val	1828	Enn. fulvus ouatalibi.
Plectropoma chloropterum, Cuv. & Val	1828	Alph. afer.
Serranus tinca, Cantraine	1831	Myct. scirenga.
Perca robusta, Couch	1832	Ep. gigas.
Serranus *inermis*, Cuv. & Val	1833	Dermatolepis inermis.
Serranus rupestris, Cuv. & Val	1833	Myct. venenosa guttata.
Serranus *tigris*, Cuv. & Val	1833	Myct. tigris.
Serranus marginatus, Lowe	1833	Ep. gigas.
Serranus fimbriatus, Lowe	1836	Ep. gigas.
Serranus fuscus, Lowe	1836	Myct. scirenga.
Serranus emarginatus, Val	1840	Myct. scirenga.
Serranus erythrogaster, De Kay	1842	Ep. morio.
Serranus *labriformis*, Jenyns	1842	Ep. labriformis.
Serranus *olfax*, Jenyns	1842	Myct. olfax.
Serranus galeus, M. & T	1842	Prom. itaiara.
Plectropoma *pictum*, Tschudi	1845	Alph. pictus.
Cerna macrogenis, Sassi	1846	Myct. scirenga
Serranus impetiginosus, M. & T.	1848	Ep. ascensionis.
Plectropoma monacanthus, M. & T.	1848	Alph. afer.
Serranus *nigritus*, Holbrook	1859	Ep. nigritus.
Serranus margaritifer, Günther	1859	Ep. niveatus.
Serranus *mystacinus*, Poey	1851	Ep. mystacinus.
Serranus *interstitialis*, Poey	1860	Myct. interstitialis.
Serranus *dimidiatus*, Poey	1860	Myct. dimidiatus.
Serranus *bonaci*, Poey	1860	Myct. bonací.
Serranus brunneus, Poey	1860	Myct. bonací.
Serranus arará, Poey	1860	Myct. bonací.
Serranus camelopardalis, Poey	1860	Myct. tigris camelopardalis.

Nominal species.	Year.	Identification.
Serranus felinus, Poey	1860	Myct. tigris.
Serranus rivulatus, Poey	1860	Myct. tigris camelopardalis.
Serranus repandus, Poey	1860	Myct. tigris.
Serranus petrosus, Poey	1860	Myct. venenosa.
Serranus decimalis, Poey	1860	Myct. bonaci.
Serranus *falcatus*, Poey	1860	Myct. falcata.
Serranus conspersus, Poey	1860	Ep. niveatus.
Serranus remotus, Poey	1860	Ep. morio.
Serranus guasa, Poey	1860	Prom. itaiara.
Serranus *dubius*, Poey	1860	Enn. dubius.
Serranus apiarius, Poey	1860	Enn. guttatus.
Serranus capreolus, Poey	1860	Ep. ascensionis.
Serranus cyclopomatus, Poey	1861	Myct. bonaci.
Serranus latepictus, Poey	1861	Myct. bonaci.
Dermatolepis punctatus, Gill	1861	Derm. punctatus.
Hyporthodus flavicauda, Gill	1861	Ep. niveatus.
Epinephelus *sellicauda*, Gill	1862	Ep. sellicauda.
Epinephelus *analogus*, Gill	1863	Ep. analogus.
Trisotropis reticulatus, Gill	1865	Myct. bonaci.
Plectropoma multiguttatum, Günther	1866	Alph. multiguttatus.
Serranus cernioides, Capello	1867	Ep. gigas.
Mycteroperca *calliura*, Poey	1867	Myct. calliurus.
Epinephelus flavolimbatus, Poey	1867	? Ep. niveatus,
Epinephelus cubanus, Poey	1867	Ep. apua.
Trisotropis aguaji, Poey	1868	Myct. bonaci.
Trisotropis chlorostomus, Poey	1868	? Myct. interstitialis.
Serranus varius, Bocourt	1868	Ep. ascensionis.
Serranus courtadré, Bocourt	1868	Ep. analogus.
Serranus quinquefasciatus, Bocourt	1868	Prom. itaiara *quinquefasciatus*.
Epinephelus chalinus, Cope	1871	Myct. scirenga.
Epinephelus ordinatus, Gill	1871	Ep. sellicauda.
Epinephelus brachysoma, Cope	1871	? Ep. gigas.
Serranus *panamensis*, Steindachner	1871	Enn. panamensis.
Menephorus punctiferus, Poey	1875	Enn. dubius.
Epinephelus *rosaceus*, Streets	1877	Myct. rosaceus.
Trisotropis *mierolepis*, Goode & Bean	1878	Myct. microlepis.
Trisotropis stomias, Goode & Bean	1878	Myct. microlepis.
Mycteroperca falcata phenax, Jordan & Swain	1884	Myct. falcata phenax.
Mycteroperca bonaci *xanthostieta*, Jordan & Swain	1884	Myct. bonaci xanthostictus.

RECAPITULATION.

We have in this paper admitted thirty-five species of *Epinephelus* as occurring in American waters. More or less doubt is attached to the systematic position or nomenclature of several of these. We therefore repeat the list here, with an indication of the nature of the doubt remaining to be solved in each case. The general distribution of the species is indicated by the letters W, (Western Atlantic, West Indies, &c.), U (coasts of United States), A (Western Africa and Southern Europe), P (Eastern Pacific, Panama, &c.), G (western coast of South America, Peru, Galapagos Islands, &c.).

I.—Genus MYCTEROPERCA, Gill.

1. *M. rosacea*, Streets. (P.)
2. *M. falcata*, Poey. (W, U.)
   b. M. falcata phenax, Jordan & Swain. (U.)
3. *M. tigris*, Cuv. & Val. (W.)
   b. M. tigris camelopardalis, Poey. (Possibly a distinct species.)
4. *M. interstitialis*, Poey. (W.) (Possibly incorrectly identified; possibly includes two species, *chlorostomus* and *interstitialis*.)
5. *M. calliura*, Poey. (W.) (Unknown to us.)
6. *M. dimidiata*, Poey. (W.) (Doubtful species; unknown to us.)
7. *M. microlepis*, Goode & Bean. (W, U.)
8. *M. scirenga*, Raf. (W, A.) (Synonymy not verified by us; possibly more than one species included.)

9. *M. bonaci*, Poey. (W,U.) (Possibly more than one species included in the synonymy.
   b. M. bonaci xanthosticta, Jordan & Swain. (U.)
10. *M. reticulata*, Gill. (W.) (Possibly has some earlier name.)
11. *M. venenosa*, L. (W, U.) (Possibly two different species included.)
   b. M. venenosa guttata, Bloch & Schneider. (W.) (Possibly a valid species.)
12. *M. olfax*, Jenyns. (Species not well described.)

II.—Genus PROMICROPS, Gill.

13. *P. itaiara*, Lichtenstein. (W, U, P.)

III.—Genus EPINEPHELUS, Bloch.

14. *E. nigritus*, Holbrook. (Species imperfectly known.)
15. *E. morio*, Cuv. & Val. (W.)
16. *E. mystacinus*, Poey. (W.)
17. *E. striatus*, Bloch. (W.)
18. *E. sellicauda*, Gill. (P.)
19. *E. niveatus*, Cuv. & Val. (W.) (Possibly two species referred to the synonymy are really different—*margaritifer* and *flavolimbatus*.)
20. *E. labriformis*, Jenyns. (G.) (Insufficiently described.)
21. *E. gigas*, Brünnich. (A. W.) (Synonymy not verified by us; possibly the American species, *mentzeli*, is different.)
22. *E. drummond-hayi*, Goode & Bean. (W, U.)
23. *E. apua*, Bloch. (W, U.) (Possibly to be called *E. guttatus* or *E. catus;* possibly a different species, *cubanus*; included in the synonymy.)
24. *E. ascensionis*, Osbeck. (W, U.) (Possibly wrongly identified with Osbeck's *ascensionis;* in that case to be called *E. atlanticus*.)
25. *E. analogus*, Gill. (P.)

IV.—Genus ALPHESTES, Bloch & Schneider.

26. *A. pictus*, Tschudi. (G.) (Species imperfectly known.)
27. *A. multiguttatus*, Günther. (P.)
28. *A. afer*, Bloch. (W, A?)

V.—Genus ENNEACENTRUS, Gill.

(Possibly includes two or three distinct genera.)

29. *E. panamensis*, Steindachner. (P.)
30. *E. guttatus*, L. (W, U.) (Possibly includes two distinct species; perhaps should stand as *E. cruentatus*, instead of *E. guttatus;* type of a genus perhaps distinct—*Petrometopon*.
   b. E. guttatus coronatus, C. & V. (W, U.)
31. *E. tæniops*, Cuv. & Val. (W, A, U.)
32. *E. fulvus*, L. (W, U.) (Possibly, but very improbably, includes two distinct species, *punctatus* and *fulvus*.)
   b. E. fulvus ouatalibi, C. & V. (W, U.)
   c. E. fulvus punctatus, L. (W, U.)
33. *E. dubius*, Poey. (W.) (Possibly two species included, *dubius* and *punctifer*.)

VI.—Genus DERMATOLEPIS, Gill.

34. *D. inermis*, C. & V. (W.)
35. *D. punctatus*, Gill. (P.)